CONTROL SYNTHESIZER

CS6x

SERVICE MANUAL

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IMPOR TANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING : Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT : This presentation or sale of this manual to any individual or firm does not constitute authorization certification, recognition of any applicable technical capabilities, or establish a principal-agent relationship of any form.

The data provided is belived to be accurate and applicable to the unit(s) indicated on the cover. The research engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING : Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground bus in the unit (heavy gauge black wires connect to this bus.)

IMPORTANT : Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

LITHIUM BA TTER Y HANDLING

This product uses a lithium battery for memory back-up.

WARNING : Lithium batteries are dangerous because they can be exploded by improper handling. Observe the following precautions when handling or replacing lithium batteries.

- Leave lithium battery replacement to qualified service personnel.
- Always replace with batteries of the same type.
- When installing on the PC board by soldering, solder using the connection terminals provided on the battery cells.
- Never solder directly to the cells. Perform the soldering as quickly as possible.
- Never reverse the battery polarities when installing.
- Do not short the batteries.
- Do not attempt to recharge these batteries.
- Do not disasemble the batteries.
- Never heat batteries or throw them into fire.

ADVARSEL!
Lithiumbatteri-Eksplosionsfare ved fejlagtig handtering. Udskiftning ma kun ske med batteri af samme fabrikat og type. lever det brugte batteri tilbage til leverandren.

VARNING
Explosionsfara vid felaktigt batteribyte.
Anvand samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera anvant batteri enligt fabrikantens instruktion.

VAROITUS
Paristo voi rajahtaa, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Havita kaytetty paristo valmistajan ohjeiden mukaisesti.

The following information complies with Dutch official Gazette 1995. 45; ESSENTIALS OF ORDER ON THE COLLECTION OF BATTERIES.

- Please refer to the diassembly procedure for the removal of Back-up Battery.
- Leest u voor het verwijderen van de backup batterij deze beschrijving.

WARNING: CHEMICAL CONTENT NOTICE!

The solder used in the production of this product contains LEAD. In addition, other electrical/electronic and/or plastic (Where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT PLACE SOLDER, ELECTRICAL/ELECTRONIC OR PLASTIC COMPONENTS IN YOUR MOUTH FOR ANY REASON WHAT SO EVER!

Avoid prolonged, unprotected contact between solder and your skin! When soldering, do not inhale solder fumes or expose eyes to solder/flux vapor!

If you come in contact with solder or components located inside the enclosure of this product, wash your hands before handling food.

■ WARNING

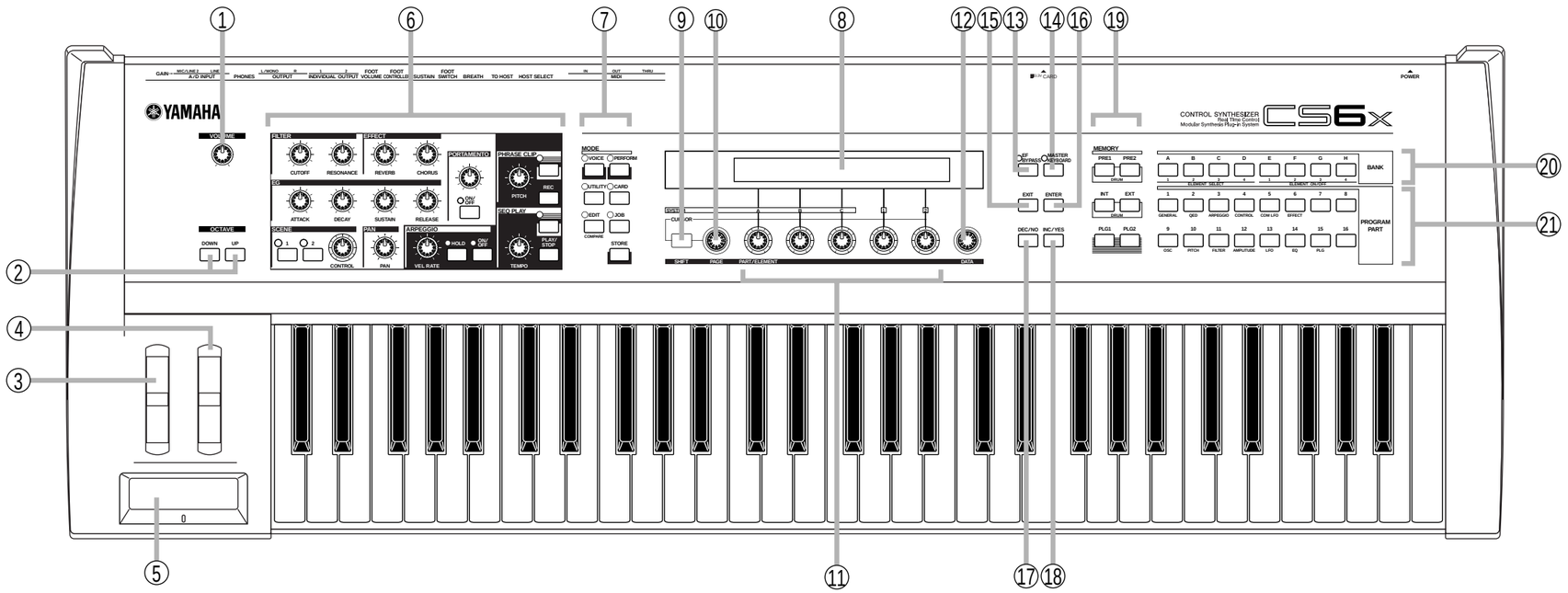
Components having special characteristics are marked ⚠ and must be replaced with parts having specification equal to those originally installed.

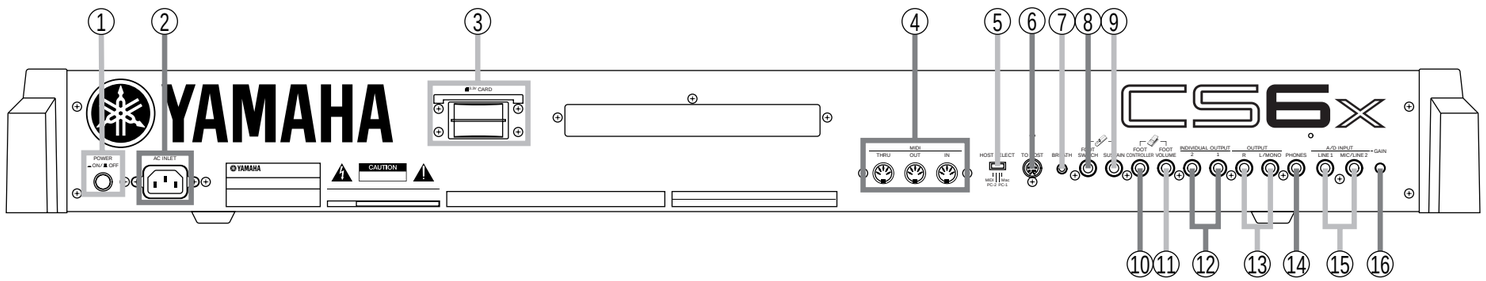
SPECIFICATIONS

CS6x		
KEYBOARD	**Number of Keys**	61
	Touch	Initial touch, Aftertouch
TONE GENERATION SYSTEM	**Tone Generators**	AWM2, Phrase Clip, Modular Synthesis Plug-in System
	Polyphony	64
VOICE	**Number of Voice**	Normal voices (256 Presets, 128 Internals [Users], 128 Externals [Memory Cards]), Drum voices (8 presets, 2 Internals [Users], 2 Externals [Memory Cards]), Plug-in voices (64 x 2 Plug-in Boards [If installed])
	Wave ROM	16 MByte
PERFORMANCE	**Multi-Timbres**	20 (16 Voice Parts, Phrase Clip Part, A/D Input Part, Plug-in 1/2 Parts)
	Number of Performance	128 Internals, 64 Externals
	Master Keyboard Mode	4 Zones
PHRASE CLIP	**Number of Clip**	256 (Max)
	Number of Clip Kits	4 (73 Keys [C0-C6] x 4 Kits)
	Sampling	16 bits linear, 44.1 kHz
	Memory	4 Mbyte (DRAM)
EFFECT	**Reverb**	12
	Chorus	23
	Insertion	24 (Insertion 1), 92 (Insertion 2), 24 (Insertion for Plug-in Voices)
SCENE		Scene 1/2, Scene Control, Scene Store
SEQUENCE PLAY	**Format**	SMF Format 0 (Direct Play only), Sequence Chain (Load/Save)
	Number of Sequence Chains	100 Steps (100 Songs)
ARPEGGIATOR	**Number of Arpebbios**	128
Card	**File Type**	All Data, All Voice Data, All Phrase Clip Data, Plug-in, Sequence Chain, SMF, WAV, AIFF
	Functions	Save, Load, Rename, Delete, Make Directory, Format
CONTROLS		Volume Knob, Octave Up/Down (CS6x), Pitch (CS6x), Modulation (CS6x), Ribbon Controller (CS6x), Scene 1, 2 (CS6x), Scene Control (CS6x), 2 Filter Knobs (CS6x), 2 Effect Knobs (CS6x), 4 EG Knobs (CS6x), Pan Knob (CS6x), Portamento ON/OFF (CS6x), Arpeggio Gate Time (CS6x), Arpeggio Hold (CS6x), Arpeggio ON/OFF (CS6x), Phrase Clip Pitch (CS6x), Phrase Clip, Phrase Clip Rec, Tempo (CS6x), Sequence Play, Sequence PLAY/STOP, Shift, Page, Knob A/B/C/1/2, Data, Effect Bypass, Master Keyboard (CS6x), Exit, Enter Dec/No, Inc/Yes, 7 Mode Keys, 6 Memory Keys, 8 Bank Keys (CS6x), 16 Program/Part Keys (CS6x), Power, Card Slot, Gain, Host Select
CONNECTORS & TERMINALS		MIDI In, Out, Thru, To Host, Breath, Footswitch (CS6x), Sustain (CS6x), Foot Controller (CS6x), Foot Volume (CS6x), Individual Output 1, 2, Output L/Mono R, Phones, A/D Input (LINE 1, MIC/LINE 2), AC Inlet, 2 Connectors for Plug-in Boards
DISPLAY		40 x 2 (Backlit)
INCLUDED ACCESSORIES		Owner's Manual, Data List , Memory Card, CD-ROM, AC Power Cord
OPTIONAL ACCESSORIES		PLG150 Plug-in Boards Series, PLG100 Plug-in Boards Series, FC4/5 Footswitch, FC7 Foot Controller, BC3 Breath Controller
POWER CONSUMPTION		16watts
OUTPUT IMPEDANCE		Output: +18.1 ±2dbm (10k ohms), Phones: +17.2 ±2dbm (33 ohms)
DIMENSIONS		1019(W) x 357(D) x 109(H) mm
WEIGHT		11.6 kg

■ PANEL LAYOUT

• **Front panel**



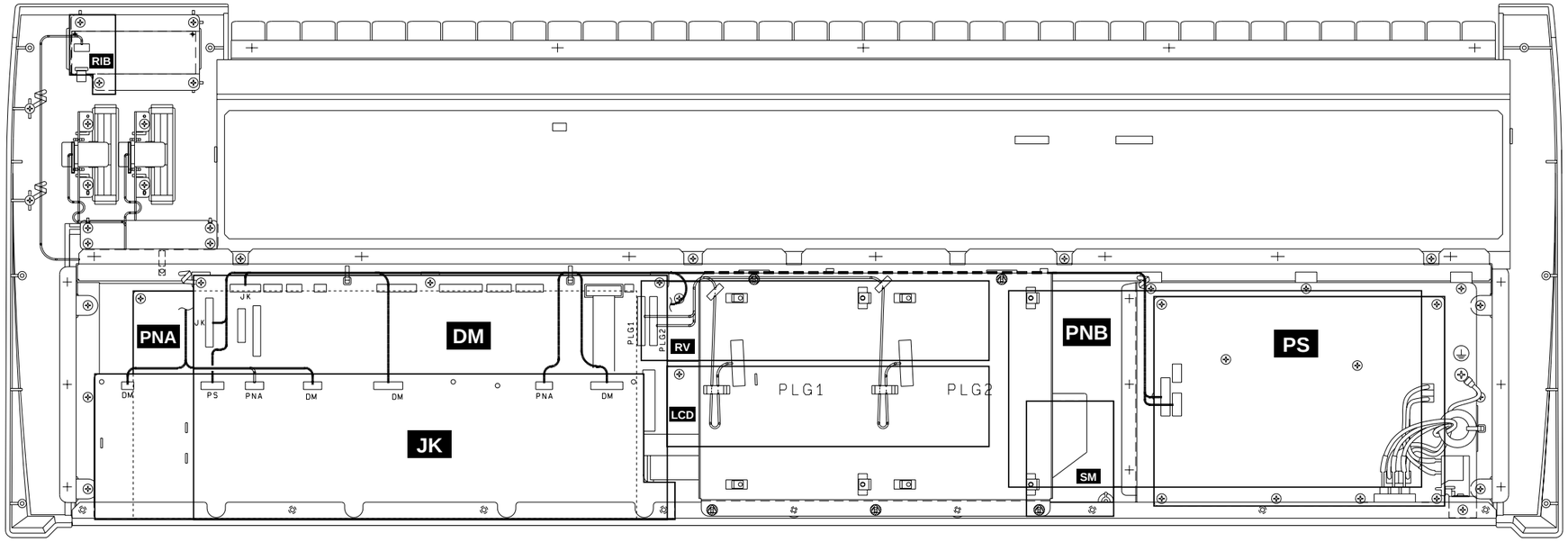


① [VOLUME] knob
② OCTAVE [UP] and [DOWN] keys
③ PITCH bend wheel
④ MODULATION wheel
⑤ Ribbon control
⑥ Sound Control knobs
⑦ MODE keys
⑧ LCD (Liquid Crystal Display)
⑨ [SHIFT] key
⑩ [PAGE] knob
⑪ Knobs [A],[B],[C],[1] and [2]
⑫ [DATA] knob
⑬ [EF BYPASS] key
⑭ [MASTER KEYBOARD] key
⑮ [EXIT] key
⑯ [ENTER] key
⑰ [DEC/NO] key
⑱ [INC/YES] key
⑲ MEMORY keys
⑳ BANK [A] to [H] keys
㉑ PROGRAM/PART [1] to [16] keys

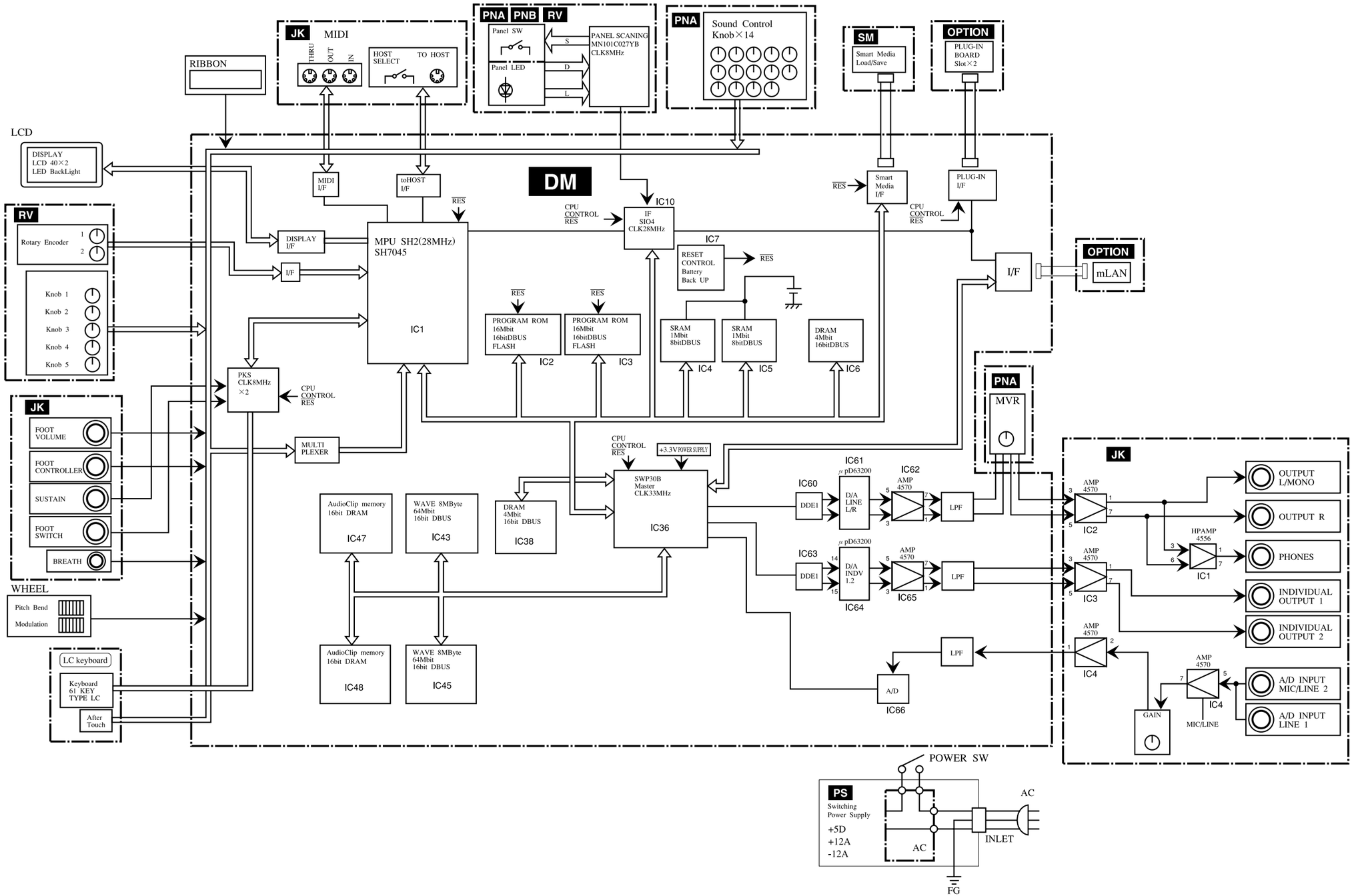
• **Rear panel**

① POWER switch
② AC INLET terminal
③ CARD slot
④ MIDI IN, OUT, and THRU connectors
⑤ HOST SELECT switch
⑥ TO HOST terminal
⑦ BREATH jack
⑧ FOOT SWITCH jack
⑨ SUSTAIN jack
⑩ FOOT CONTROLLER jack
⑪ FOOT VOLUME jack
⑫ INDIVIDUAL OUTPUT 1 and 2 jacks
⑬ OUTPUT L/MONO and R jack
⑭ PHONES jack
⑮ A/D INPUT jack
⑯ GAIN knob

■ CIRCUIT BOARD LAYOUT



■ BLOCK DIAGRAM



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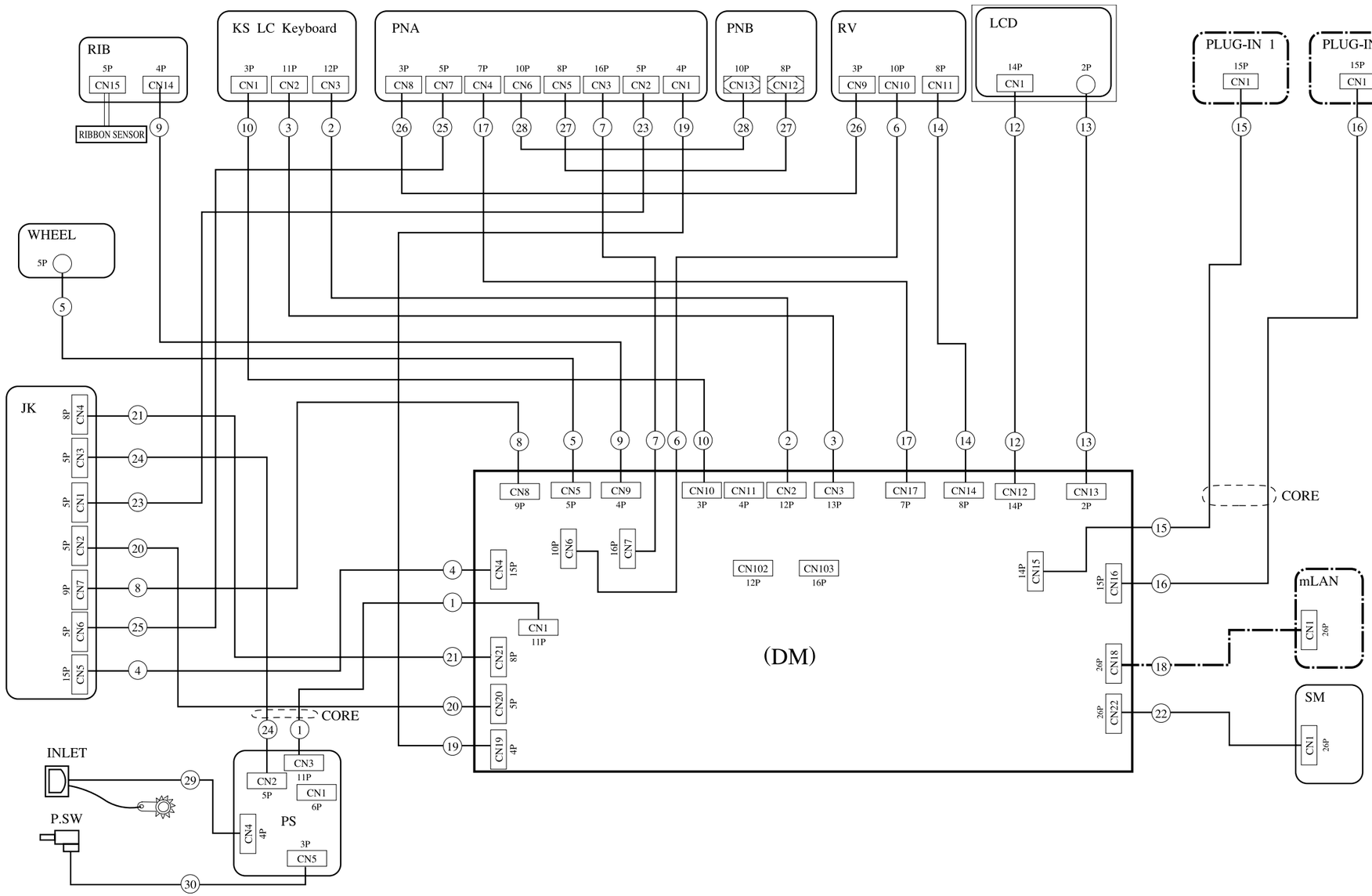
■ WIRING



	Location	Connector Assembly	Remarks	Parts List Ref. No.
✻1	①	DM-PS	11P/L800	OVERALL 800
	②	DM-KS^{A}	12P/L600	OVERALL 410
	③	DM-KS^{B}	13P/L500	OVERALL 420
	④	KRD-KRD	15P/L400	OVERALL 430
	⑤	WHEEL	5P/L100	WHEEL 80
	⑥	KRD-KRD	10P/L550	PANEL 200
	⑦	KRD-KRD	16P/L750	PANEL 210
	⑧	KRD-KRD	9P/L200	OVERALL 440
	⑨	DM-RIB	4P/L350	OVERALL 450
	⑩	DM-KS^{A}	3P/L300	OVERALL 460
	⑫	DM-LCD	14P/L300	—
	⑬	DM-LCD	2P/L500	—
	⑭	KRD-KRD	8P/L400	PANEL 220
✻2	⑮	DM-PLUG IN 1	15P/L250	OVERALL 470
✻2	⑯	DM-PLUG IN 2	15P/L350	OVERALL 470
	⑰	KRD-KRD	7P/L450	PANEL 230
	⑱	DM-mLAN	26P	OPTION
	⑲	DM-MVR	4P/L100(S)	PANEL 240
	⑳	KRD-KRD	5P/L300	OVERALL 490
	㉑	DM-JK	4P/L200(S)	OVERALL 500
	㉒	DM-SM	26P/L430	PANEL 250
	㉓	JK-MVR	5P/L300	PANEL 260
✻1	㉔	JK-PS	5P/L850	OVERALL 800
	㉕	KRD-KRD	5P/L400	PANEL 270
	㉖	KRD-KRD	3P/L200	PANEL 280
	㉗	DS-KP	8P-500L	PNA CN5
	㉘	DS-KP	10P-500L	PNA CN6
	㉙	AC INLET	3P	POWER SUPPLY 50
	㉚	POWER SW.	3P-100L	POWER SUPPLY 40

✻1 Connector Assembly(PS Core)
✻2 Connector Assembly(PLUG Core)

■ DISASSEMBLY PROCEDURE

1. Bottom Assembly

Remove the thirty-five (35) screws marked [104], the two (2) corner plates, marked [102], and the two (2) coin screws marked [106]. The botton assembly can then be removed.

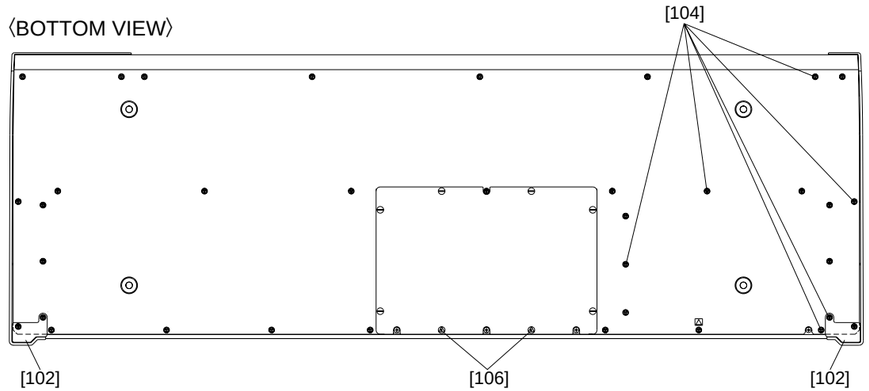


Fig.1

[102]: Coner Plate (V4196900)
[104]: Bind Head Tapping Screw-B 3.0X8 MFZN2BL (EP600190)
[106]: Screw 3.0X6 (V2517100)

2. Circuit Boards and Units

After removing the bottom assembly, remove the circuit board and unit, following the procedure in the below table.

Circuit Board & Unit	Ref No.	PARTS NAME	PARTS No.	Q'ty	Fig.
KEYBOARD Ass'y	72	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	4	2
Touch Volume	62	Bind Head Tapping Screw-B 3.0 X 8 MFZN2BL	EP600190	4	2
Wheel Ass'y	42	Bind Head Tapping Screw-B 3.0 X 8 MFZN2BL	EP600290	4	2
PS Ass'y	92	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	6	2

• JK, DM, PNA

Circuit Board & Unit	Ref No.	PARTS NAME	PARTS No.	Q'ty	Fig.
JK	322	Bonding Tapping Screw-B 3.0 X 10 MFZN2BL	VQ049800	9	2
DM	122	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL Remove the DM circuit board with the DM sheeld plate.	EP600230	7	3
PNA	32	Bind Head Tapping Screw-B 3.0 X 10 MFZN2BL	EP600230	11	4

• SM, RV, Display Ass'y

Circuit Board & Unit	Ref No.	PARTS NAME	PARTS No.	Q'ty	Fig.
PLG Support Brecket	112	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	5	2
SM	62	Bind Head Tapping Screw-B 3.0 X 8 MFZN2BL	EP600190	2	2
JK	322	Bonding Tapping Screw-B 3.0 X 10 MFZN2BL	VQ049800	9	2
DM	122	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL Remove the DM circuit board with the DM sheeld plate.	EP600230	7	3
RV	52	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	8	4
Display Ass'y	22	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	4	4

• PNB

Circuit Board & Unit	Ref No.	PARTS NAME	PARTS No.	Q'ty	Fig.
PS Ass'y	92	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	6	2
PLG Support Brecket	112	Bind Head Tapping Screw-B 3.0 X 6 MFZN2BL	EP600230	5	2
SM	62	Bind Head Tapping Screw-B 3.0 X 8 MFZN2BL	EP600190	2	2
PNB	42	Bind Head Tapping Screw-B 3.0 X 8 MFZN2BL	EP600190	11	4

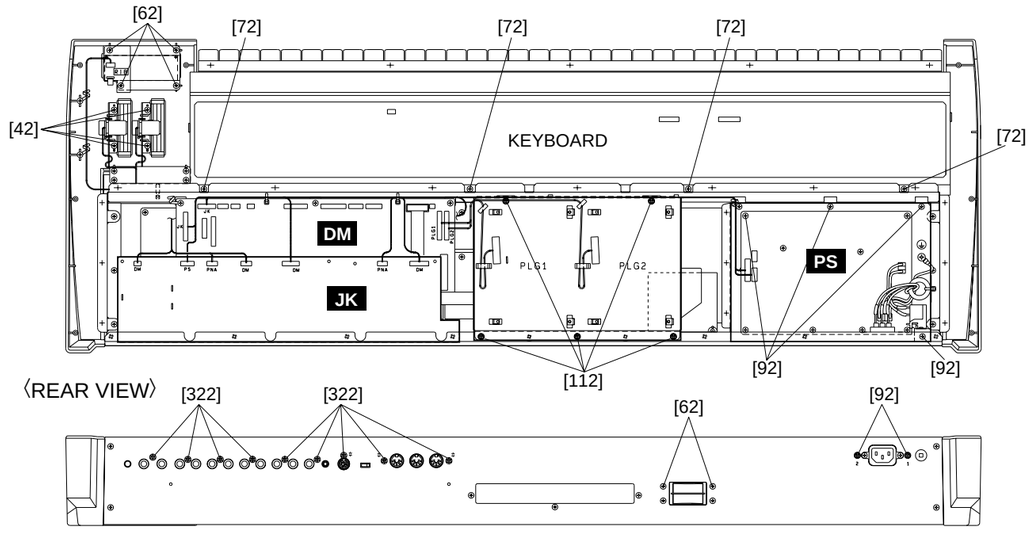


Fig.2

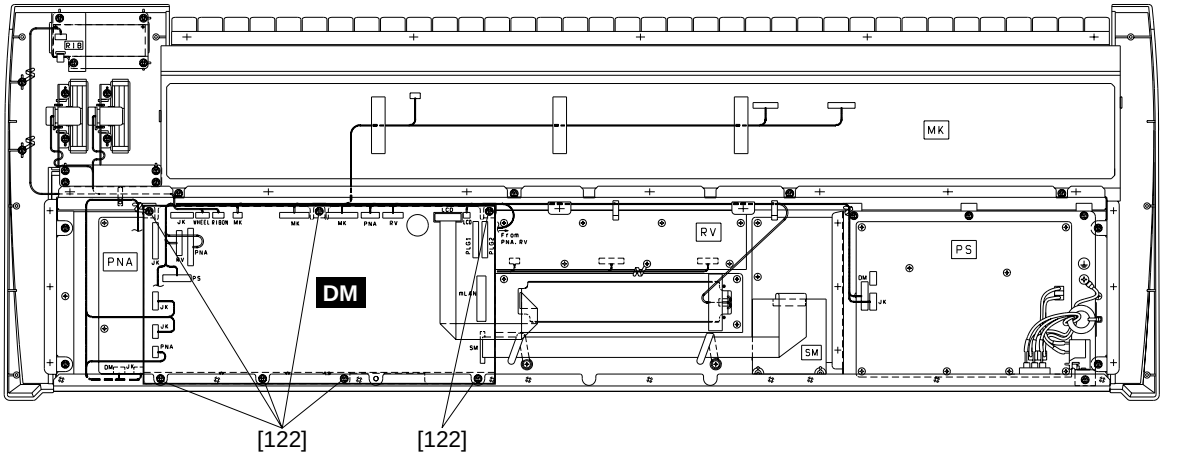


Fig.3

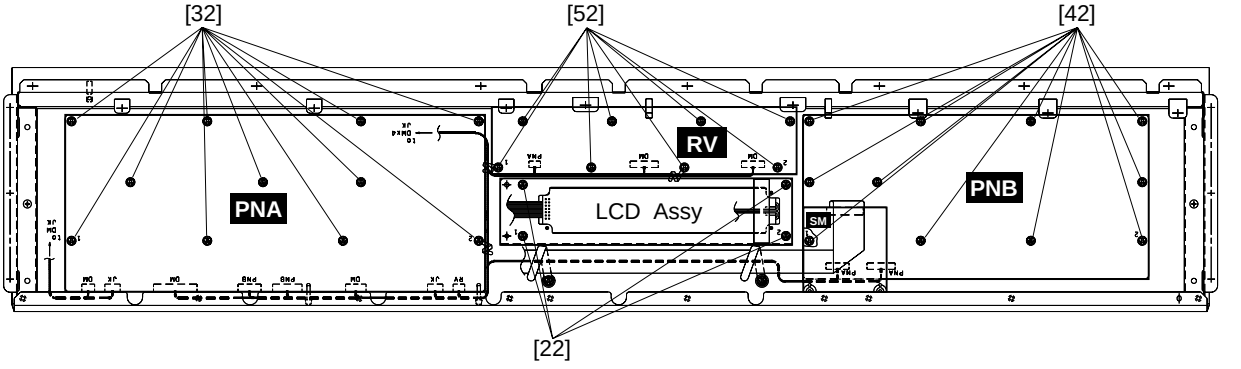


Fig.4

3. Keyboard Assembly

3-1 Remove the bottom assembly. (See Procedure 1.)

3-2 Remove the four(4) screws marked [72].
The keyboard Assembly can then be removed.(Fig.2)

LSI PIN DESCRIPTION

● **HD64F7045F28** (XW419A00) **CPU**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	/WRHH	O	HH write	73	D15	I/O	Data bus
2	PE14	I/O	LCD data 6 input / output	74	D14	I/O	
3	/WRHL	O		75	D13	I/O	
4	PA21	I	MLAN insert detect	76	D12	I/O	
5	PE15	I/O	LCD data 7 input / output	77	VCC77	-	Power supply
6	VSS6	-	Ground	78	D11	I/O	Data bus
7	A0	O	Address bus	79	VSS79	-	Ground
8	A1	O		80	D10	I/O	Data bus
9	A2	O		81	D9	I/O	
10	A3	O		82	D8	I/O	
11	A4	O		83	D7	I/O	
12	VCC12	-	Power supply	84	D6	I/O	
13	A5	O	Address bus	85	VCC85	-	Power supply
14	VSS14	-	Ground	86	D5	I/O	Data bus
15	A6	O	Address bus	87	VSS87	-	Ground
16	A7	O		88	D4	I/O	Data bus
17	A8	O		89	D3	I/O	
18	A9	O		90	D2	I/O	
19	A10	O		91	D1	I/O	
20	A11	O		92	D0	I/O	
21	A12	O		93	VSS93	-	Ground
22	A13	O		94	XTAL	I	Crystal oscillator
23	A14	O		95	MD3	I	Mode select
24	A15	O		96	EXTAL	I	Crystal oscillator
25	A16	O		97	MD2	I	Mode select
26	VCC26	-	Power supply	98	NMI	-	Non-maskable interrupt
27	A17	O	Address bus	99	VCC99/FWP99	-	Power supply
28	VSS28	-	Ground	100	PA16	I	Encoder 1B input
29	PA20	I	Encoder 2A input	101	PA17	I	Encoder 1A input
30	PA19	I	Encoder 2B input	102	MD1	I	Mode select
31	PB2	O	Row address strobe	103	MD0	I	Mode select
32	PB3	O	Column address strobe (low)	104	PLLVCC	-	PLL power supply
33	PA18	I	Host off line detect input	105	PLLCAP	-	PLL capacitor
34	PB4	O	Column address strobe (high)	106	PLLVSS	-	PLL ground
35	VSS35	-	Ground	107	PA15	O	CPU clock out
36	PB5	O	DRAM read/write	108	/RES	-	Reset
37	A18	O	Address bus	109	TIOCOA	I	A/D jack insert detect interrupt request input
38	A19	O		110	PE1	I	Smart MINS
39	A20	O		111	PE2	I	Model detection
40	VCC40	-	Power supply	112	VCC112	-	Power supply
41	A21	O	Address bus	113	PE3	I	Smart busy input
42	VSS42	-	Ground	114	PE4	I	MLAN reset interrupt request input
43	/RD	O	Read	115	PE5	O	1M clock out
44	/WDTOVF	-	Not used	116	PE6	I	Model detection
45	D31	I/O	Data bus	117	VSS117	-	Ground
46	D30	I/O		118	AN0	I	Analog input
47	/WRH	O	High write	119	AN1	I	
48	WRL	O	Low write	120	AN2	I	
49	/CS1	O	Chip Select 1	121	AN3	I	
50	CS0	O	Chip Select 0	122	AN4	I	
51	PA9	I	MLAN MIDI interrupt request	123	AN5	I	
52	PA8	I	Interrupt request	124	AVSS	-	Analog ground
53	/CS3	O	Chip select 3	125	AN6	I	Analog input
54	/CS2	O	Chip select 2	126	AN7	I	
55	VSS55	—	Ground	127	AVREF	-	Analog reference voltage
56	D29	I/O	Data bus	128	AVCC	-	Analog power supply
57	D28	I/O		129	VSS129	-	Ground
58	D27	I/O		130	RXD0	I	MIDI input
59	D26	I/O		131	TXD0	O	MIDI output
60	D25	I/O		132	/IRQ0	I	Plug in sireal interrupt request input
61	VSS61	-	Ground	133	RXD1	I	HOST input
62	D24	I/O	Data bus	134	TXD1	O	HOST output
63	VCC63	-	Power supply	135	VCC135	-	Power supply
64	D23	I/O	Data bus	136	/IRQ1	I	MLAN MIDI interrupt input
65	D22	I/O		137	PE7	I	Smart Vprt Input
66	D21	I/O		138	PE8	I/O	LCD data 0 input / output
67	D20	I/O		139	PE9	I/O	LCD data 1 input / output
68	D19	I/O		140	PE10	I/O	LCD data 2 input / output
69	D18	I/O		141	VSS141	-	Ground
70	D17	I/O		142	PE11	I/O	LCD data 3 input / output
71	VSS71	-	Ground	143	PE12	I/O	LCD data 4 input / output
72	D16	I/O	Data bus	144	PE13	I/O	LCD data 5 input / output

● HD63B01Y0RCE0F (XM234A00) CPU (PKS)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	/NMI	I	Non-maskable interrupt	33	M1/S8	I	Make contact of key receive/ Switch receive
2	E	O	Key scan drive	34	M0/S7	I	
3	D#	O		35	Vss		Ground
4	D	O		36	F	O	Key scan drive
5	C#	O		37	F#	O	
6	CL	O		38	G	O	
7	PULL 1			39	G#	O	
8	PULL 2			40	A	O	
9	LC.AE//FS	I	connected to ground	41	A#	O	
10	/REPEAT	I	Auto repeat (L:on, H:off)	42	B	O	
11	/KOF-REQ	I	Key off request	43	C	O	
12	SW1	I	Switch 1 (L: on, H: off)	44	LC//AE	I	connected to +5V
13	SW2	I	Switch 2 (L: on, H: off)	45	B6/S6	I	Break contact of key receive/ Switch receive
14	/IS	I	Input strobe	46	B5/S5	I	
15	/OS	I	Output strobe	47	B4/S4	I	
16	SW3	I	Switch 3 (L: on, H: off)	48	B3/S3	I	
17	SW4	I	Switch 4 (L: on, H: off)	49	B2/S2	I	
18	DOUT0	O	Data output	50	B1/S1	I	
19	DOUT1	O		51	B0/S0	I	
20	DOUT2	O		52	Se	O	Switch drive
21	DOUT3	O		53	Sd	O	
22	DOUT4	O		54	Sc	O	
23	DOUT5	O		55	Sb	O	
24	DOUT6	O		56	Sa	O	
25	DOUT7	O		57	E		Not used
26	Vcc		Power supply (+5V)	58	Vss		Ground
27	Sf	O	Switch drive	59	XTAL		Not used
28	M5/S13	I	Make contact of key receive/ Switch receive	60	EXTAL	I	8 MHz clock
29	M4/S12	I		61	MP0	I	Mode program 0
30	M3/S10	I		62	MP1	I	Mode program 1
31	M2/S9	I		63	/RES	I	Initial clear
32	M1/S8	I		64	/STBY	I	Stanby-mode signal

● µ PD63200GS (XM145A00) DAC (Digital to Analog Converter)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	4/8F	I	4/8 Fs selection	9	R. REF		Channel R voltage reference
2	D. GND		Digital ground	10	L. REF		Channel L voltage reference
3	16 BIT	I	16 bit/18 bit selection	11	L. OUT	O	Channel L output
4	D. VDD		Digital power supply	12	A. GND		Analog ground
5	A. GND		Analog ground	13	WDCK	I	Word clock
6	R. OUT	O	Channel R output	14	RSI	I	Channel R series input
7	A. VDD		Analog power supply	15	SI/LSI	I	Series input/Channel L series nput
8	A. VDD			16	CLK	I	Clock

● JG710069 (XM326B00) DDE1 (DAC Dynamic Range Enhancer)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	CLK	I	Master clock	9	SH 0	O	N.C.
2	SYW	I	Sync signal	10	SH 1	O	N.C.
3	MIN 1	I	Signal input	11	LE	O	Latch enable for DAC
4	MIN 0	I	Signal input	12	V_{DD}		Power supply
5	Vss		Ground	13	DACO 0	O	Output (DAC)
6	SEL 1	I	Mode select	14	DACO 1	O	Output (DAC)
7	SEL 0	I	Mode select	15	DCLK	O	Clock for DAC
8	SUP	I	1 bit shift up input	16	ICN	I	Initial clear

● **TC203C760HF-002** (XS725A00) SWP30B AWM Tone Generator coped with MEG) Standard Wave Processor

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	Vss		(Ground)	121	VSS		(Ground)
2	CA0	I		122	HMD0	I/O	
3	CA1	I		123	HMD1	I/O	
4	CA2	I		124	HMD2	I/O	
5	CA3	I		125	HMD3	I/O	
6	CA4	I		126	HMD4	I/O	
7	CA5	I	Address bus of internal register	127	HMD5	I/O	
8	CA6	I		128	HMD6	I/O	Wave memory data bus (Upper 16 bits)
9	CA7	I		129	HMD7	I/O	
10	CA8	I		130	HMD8	I/O	
11	CA9	I		131	HMD9	I/O	
12	CA10	I		132	HMD10	I/O	
13	CA11	I		133	HMD11	I/O	
14	VSS		(Ground)	134	HMD12	I/O	
15	CD0	I/O		135	HMD13	I/O	
16	CD1	I/O		136	HMD14	I/O	
17	CD2	I/O		137	HMD15	I/O	
18	CD3	I/O		138	VSS		(Ground)
19	CD4	I/O		139	HMA0	O	
20	CD5	I/O		140	HMA1	O	
21	CD6	I/O		141	HMA2	O	
22	CD7	I/O		142	HMA3	O	
23	CD8	I/O	Data bus of internal register	143	HMA4	O	
24	CD9	I/O		144	HMA5	O	
25	CD10	I/O		145	HMA6	O	
26	CD11	I/O		146	HMA7	O	
27	CD12	I/O		147	HMA8	O	
28	CD13	I/O		148	HMA9	O	
29	CD14	I/O		149	HMA10	O	
30	VDD		(Power supply)	150	VDD		(Power supply)
31	VSS		(Ground)	151	VSS		(Ground)
32	CD15	I/O		152	HMA11	O	
33	CSN	I	Chip select	153	HMA12	O	Wave memory address bus
34	WRN	I	Write strobe	154	HMA13	O	
35	RDN	I	Read strobe	155	HMA14	O	
36	VDD		(Power supply)	156	HMA15	O	
37	SYSH0	O		157	HMA16	O	
38	SYSH1	O		158	HMA17	O	
39	SYSH2	O		159	HMA18	O	
40	SYSH3	O	NSYS/LNSYS upper 16 bits output	160	HMA19	O	
41	SYSH4	O		161	HMA20	O	
42	SYSH5	O		162	HMA21	O	
43	SYSH6	O		163	HMA22	O	
44	SYSH7	O		164	HMA23	O	
45	KONO0	O		165	HMA24	O	
46	KONO1	O	Key on data	166	VSS		(Ground)
47	KONO2	O		167	MRASN	O	RAS when DRAM(s) is connected to wave memory
48	KONO3	O		168	MCASN	O	CAS when DRAM(s) is connected to wave memory
49	VSS		(Ground)	169	MOEN	O	Wave memory output enable
50	SYSL0	I/O		170	MWEN	O	Wave memory write enable
51	SYSL1	I/O		171	VSS		(Ground)
52	SYSL2	I/O		172	LMD0	I/O	
53	SYSL3	I/O	NSYS input/LNSYS output lower 8 bits	173	LMD1	I/O	
54	SYSL4	I/O		174	LMD2	I/O	
55	SYSL5	I/O		175	LMD3	I/O	
56	SYSL6	I/O		176	LMD4	I/O	
57	SYSL7	I/O		177	LMD5	I/O	
58	KONI0	I		178	LMD6	I/O	
59	KONI1	I	Key on data input	179	LMD7	I/O	Wave memory data bus (Lower 16 bits)
60	VDD	I	(Power supply)	180	VDD		(Power supply)
61	VSS		(Ground)	181	VSS		(Ground)
62	KONI2	I		182	LMD8	I/O	
63	KONI3	I		183	LMD9	I/O	
64	DAC0	O	DAC output	184	LMD10	I/O	
65	DAC1	O		185	LMD11	I/O	
66	WCLK	O	DAC0/DAC1 word clock	186	LMD12	I/O	
67	MELO0	O		187	LMD13	I/O	
68	MELO1	O		188	LMD14	I/O	
69	MELO2	O		189	LMD15	I/O	
70	MELO3	O	MEL wave data output	190	VSS		(Ground)
71	MELO4	O		191	LMA0	O	
72	MELO5	O		192	LMA1	O	
73	MELO6	O		193	LMA2	O	
74	MELO7	O		194	LMA3	O	
75	VDD		(Power supply)	195	LMA4	O	
76	ADLR	O	ADC word clock	196	LMA5	O	
77	MELI0	I		197	LMA6	O	
78	MELI1	I		198	LMA7	O	
79	MELI2	I		199	LMA8	O	
80	MELI3	I	MEL wave data input	200	LMA9	O	
81	MELI4	I		201	LMA10	O	
82	MELI5	I		202	LMA11	O	
83	MELI6	I		203	VSS		(Ground)
84	MELI7	I		204	LMA12	O	
85	VSS		(Ground)	205	LMA13	O	Wave memory address bus (Lower data memory)
86	RCASN	O	DRAM column address strobe (RAS signal)	206	LMA14	O	
87	RA8	O		207	LMA15	O	
88	RA7	O		208	LMA16	O	
89	RA6	O		209	LMA17	O	
90	VDD		(Power supply)	210	VDD		(Power supply)
91	VSS		(Ground)	211	VSS		(Ground)
92	RA5	O	DRAM address bus	212	LMA18	O	
93	RA4	O		213	LMA19	O	
94	RA3	O		214	LMA20	O	
95	RA2	O		215	LMA21	O	
96	RA1	O		216	LMA22	O	
97	RA0	O		217	LMA23	O	
98	RRASN	O	DRAM row address strobe (RAS signal)	218	LMA24	O	
99	RWEN	O	DARM write enable	219	VSS		(Ground)
100	VSS		(Ground)	220	SYO	O	Sync. signal for master clock
101	RD7	I/O		221	SYOD	O	Sync. signal for HCLK/QCLK
102	RD6	I/O		222	QCLK	O	1/12 master clock (64Fs)
103	RD5	I/O		223	HCLK	O	1/6 master clock (128Fs)
104	RD4	I/O		224	CK256	O	1/3 master clock (256Fs)
105	RD3	I/O		225	SYSCLK	O	1/2 master clock (384Fs)
106	RD2	I/O		226	VDD		(Power supply)
107	RD1	I/O		227	SYI	I	Sync. clock
108	RD0	I/O		228	MCLKI	I	Master clock input
109	VSS		(Ground)	229	MCLKO	O	Master clock output
110	RD17	I/O		230	VDD		(Power supply)
111	RD16	I/O	DRAM data bus	231	XIN	I	Crystal osc. input
112	RD15	I/O		232	XOUT	O	Crystal osc. output
113	RD14	I/O		233	VSS		(Ground)
114	RD13	I/O		234	ICN	I	Initial clear
115	RD12	I/O		235	CHIP2	I	2 chips mode enable
116	RD11	I/O		236	SLAVE	I	Master/Slave select when 2 chips mode
117	RD10	I/O		237	TESTON	I	
118	RD9	I/O		238	ACIN	I	Test pin
119	RD8	I/O		239	DCTEST	I	
120	VDD		(Power supply)	240	VDD		(Power supply)

● **MN101C027YB** (XS711200) CPU

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	S1	I		33	S12	I	
2	S2	I		34	S13	I	Switch matrix data
3	S3	I	Switch matrix data	35	S14	I	
4	S4	I		36	TXD	O	MIDI transmit data
5	S5	I		37	S15	I	
6	VREF+	-	Power supply (+5V, analog)	38	S16	I	Switch matrix data
7	VDD	-	Power supply (+5V)	39	S17	I	
8	OSC2	O	Crystal oscillator (8MHz)	40	S18	I	
9	OSC1	I	Crystal oscillator (8MHz)	41	L16	O	
10	VSS	-	Ground	42	L17	O	
11	XI	I	Not used	43	L18	O	
12	XO	O	Not used	44	L19	O	
13	MMOD	I	Memory mode select (Grounded)	45	L8	O	
14	RD0	O	Rotary encoder data	46	L9	O	LED drive data
15	RXD	I	MIDI receive data	47	L10	O	
16	D0	O		48	L11	O	
17	D1	O		49	L12	O	
18	D2	O	LED and switch drive data	50	L13	O	
19	D3	O		51	L14	O	
20	D4	O		52	L15	O	
21	/RST	I	Reset	53	L7	O	
22	D5	O		54	L6	O	
23	D6	O		55	L5	O	
24	D7	O	LED and switch drive data	56	L4	O	LED and switch drive data
25	D8	O		57	L3	O	
26	D9	O		58	L2	O	
27	S6	I		59	L1	O	
28	S7	I		60	L0	O	
29	S8	I	Switch matrix data	61	VREF	-	Grounded
30	S9	I		62	AD0	I	Analog input
31	S10	I		63	AD1	I	Analog input
32	S11	I		64	S0	I	Switch matrix data

● **MBCG46183-129** (XV833A00) **Gate Array**

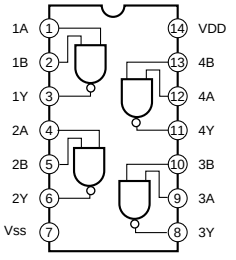
PIN NO	NAME	I/O	FUNCTION	PIN NO	NAME	I/O	FUNCTION
1	D5	I/O		25	TX31	O	Transmit Data 31
2	D6	I/O	Data Bus	26	RX32	I	Receive Data 32
3	D7	I/O		27	TX32	O	Transmit Data 32
4	/IRQ0	I/O	Interrupt Request Port 0	28	RX33	I	Receive Data 33
5	/IRQ1	I/O	Interrupt Request Port 1	29	TX33	I/O	Transmit Data 33
6	VSS	-	Ground	30	/IC	I	Initial Clear
7	/IRQ2	I/O	Interrupt Request Port 2	31	VSS	-	Ground
8	/IRQ3	I/O	Interrupt Request Port 3	32	XI	I	Quartz Crystal Input
9	/RD	I	Read Signal Input	33	VSS	-	Ground
10	/WR	I	Write Signal Input	34	XO	I/O	Quartz Crystal Output
11	/CE	I	Chip Enable Input	35	A0	I	
12	/ASTB	I	Address Strobe (Not used: to ground)	36	A1	I	
13	TESTSIO	I	Input with Pull-down Resistor (50k)	37	A2	I	Address Bus
14	RX0	I	Receive Data 0	38	A3	I	
15	TX0	O	Transmit Data 0	39	A4	I	
16	RX1	I	Receive Data 1	40	A5	I	
17	TX1	O	Transmit Data 1	41	CPUCLK	I	CPU Clock
18	VSS	-	Ground	42	VSS	-	Ground
19	VDD	-	Power Supply	43	VDD	-	Power Supply
20	RX2	I	Receive Data 2	44	D0	I/O	
21	TX2/BO2	O	Transmit Data 2	45	D1	I/O	
22	RX30	I	Receive Data 30	46	D2	I/O	Data Bus
23	TX30	O	Transmit Data 30	47	D3	I/O	
24	RX31	I	Receive Data 31	48	D4	I/O	

● **PCM1800** (XU770A00) **A/D Converter**

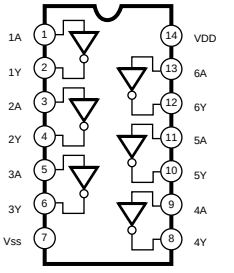
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	VINL	I	Analog input (L ch.)	13	LRCK	I/O	Sampling clock input/output
2	VREF1	-	Reference 1 decoupling cap.	14	BCK	I/O	Bit clock input/output
3	REFCOM	-	Reference decoupling common	15	DOUT	O	Audio data output
4	VREF2	-	Reference 2 decoupling cap.	16	SYSCK	I	System clock input
5	VINR	I	Analog input (R ch.)	17	DGND	-	Digital ground
6	RSTB	I	Reset input active “L”	18	VDD	-	Power supply +5V
7	BYPAS	I	LCF bypass control	19	CINNR	-	Anti-aliasing filter cap. (-) R ch.
8	FMT0	I	Audio data format 0	20	CINPR	-	Anti-aliasing filter cap. (+) R ch.
9	FMT1	I	Audio data format 1	21	CINNL	-	Anti-aliasing filter cap. (-) L ch.
10	MODE0	I	Master/Slave mode selection 0	22	CINPL	-	Anti-aliasing filter cap. (+) L ch.
11	MODE1	I	Master/Slave mode selection 1	23	VCC	-	Analog power supply
12	FSYNC	I/O	Frame sync. input/output	24	AGND	-	Analog ground

■ IC BLOCK DIAGRAM

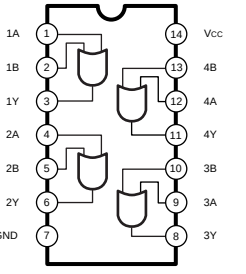
● **TC74VHC00F**(XT229A00)
IC73
MAND



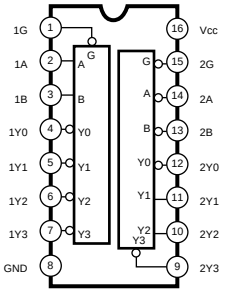
● **TC74VH04F** (XM332A00)
IC54
Inverter



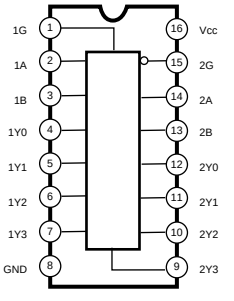
● **TC74VH32F**(XN963A00)
IC29, IC55
OR



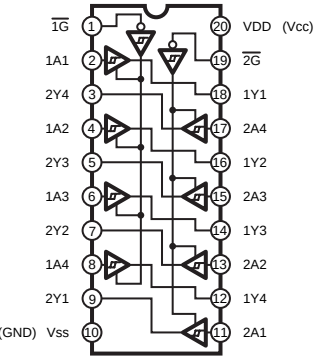
● **TC74LVC139FPEL**(XS048A00)
IC26, IC42
Demultiplexer



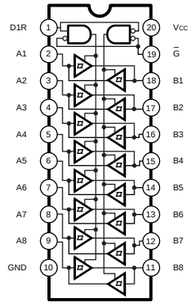
● **TC74VHC157FF**(XN966A00)
IC103
Multiplexer



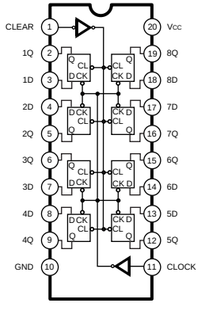
● **TC74VHC244F**(XT800A00)
IC51
Bus Buffer



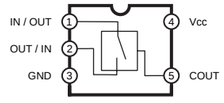
- **TC74VHC245F**(XT487A00)
  IC11,IC101
  Transceiver



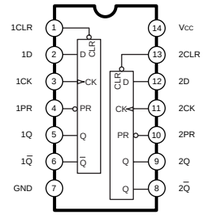
- **TC74VHC273F**(XN971A00)IC52
  SN74HC273NSR(XH223A00)
  IC27, IC28,IC52
  D-FF



- **TC7S66FF**(XR682A00)
  IC30
  Analog Switch

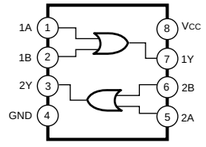


- **TC74HC74AF** (XP003A00)
  IC18,IC19
  Dual D-Type Flip-Flop

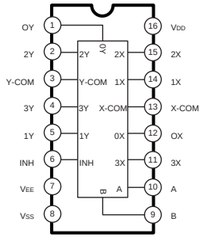


INPUTS				OUTPUTS	
PR	CLR	CLK	D	Q	Q
L	H	×	×	H	L
H	L	×	×	L	H
L	L	×	×	H	H
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	×	Q_O	Q_O

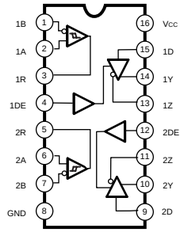
- **TC7W32FU(TE12L)** (XQ173A00)
  IC75
  OR



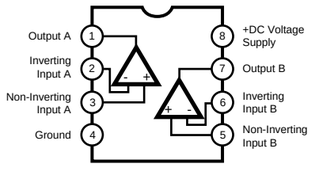
- **TC74HC4052AF** (XS790A00)
  IC13,IC14,IC15,IC16
  Multiplexer



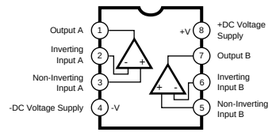
- **M5M34051FP**(XV103A00)
  IC12
  Line Transceiver



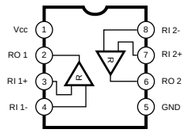
- **NJM4556AMT1**(XQ138A00)
  IC23
  Operation Amplifier



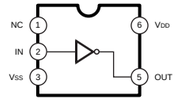
- **NJM4556AD** (XQ824A00)
- **NJM4558D-V** (IG001390)
- **μPC4570G2** (XF291A00)
- **μPC4570C** (XC520A00)
  IC62,IC65,IC68,IC74
  Dual Operational Amplifier



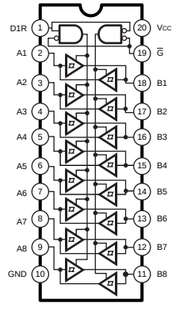
- **DS90C402M** (XW357A00)
  IC102
  Line Receiver



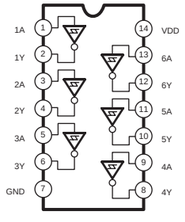
- **SC7SU04FEL** (XI348A00)
  IC21
  Inverter



- **TC74VHCT245AF**(XV242A00)
- **TC74VHCT245AFT**(XT744A00)
- **SN74HC245NSR**(XD838A00)
  IC31,IC50
  Buffer
  Octo1 3-state Bus Transceiver

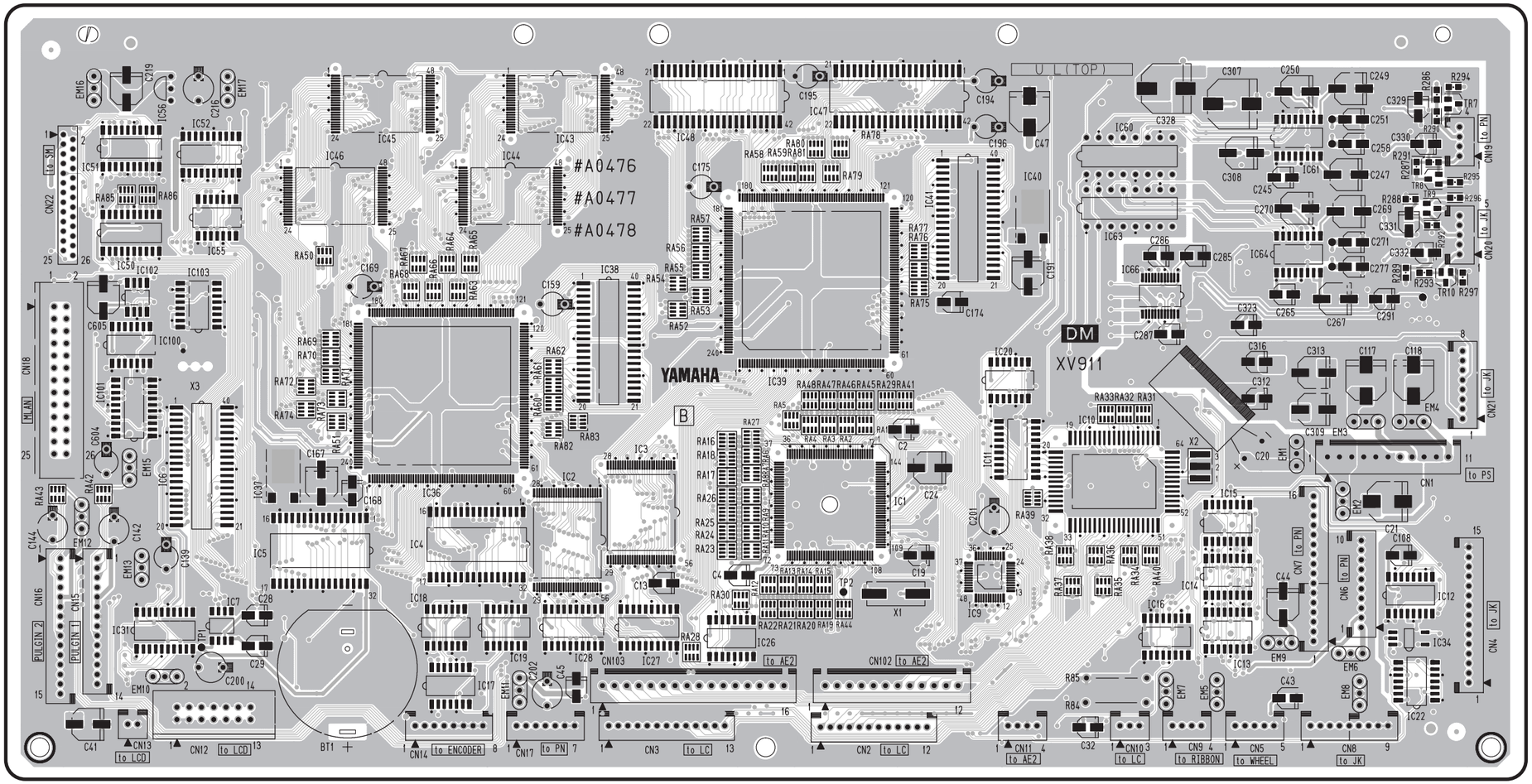


- **TC74HC14AF-TP1** (XD657A00)
  IC8,IC17,IC20,IC22,IC32,IC100
  Hex Inverter



■ CIRCUIT BOARDS

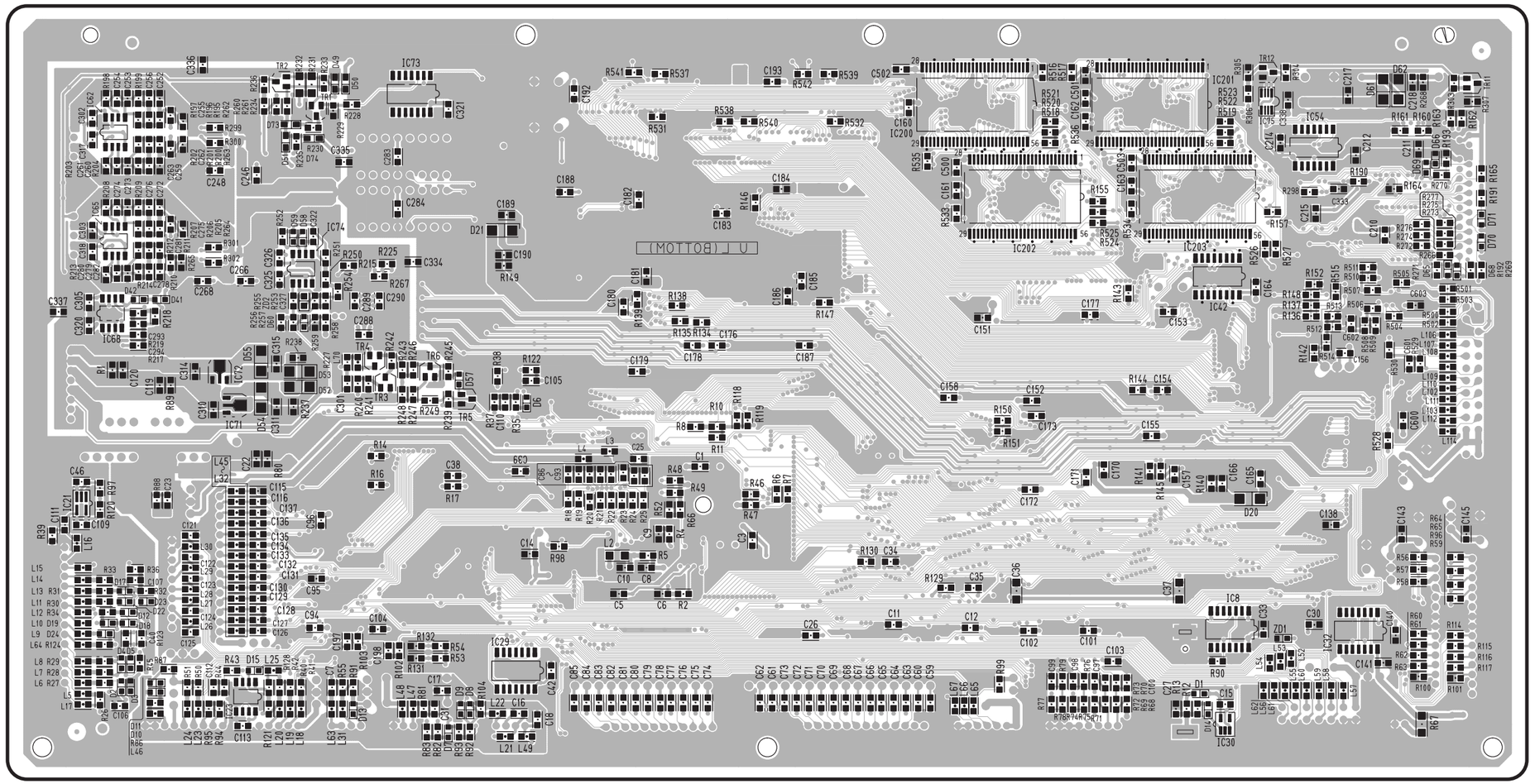
• DM Circuit Board



Component side

Note : See parts list for details of circuit board component parts.

DM: 2NA-V357640 ⚠1

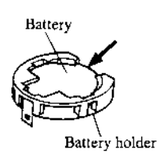


Pattern side

Battery VN103500

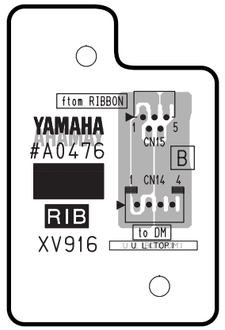
VN103600(Battery holder for VN103500)

- Notice for back-up battery removal
  Push the battery as shows in figure, then the battery will pop up.
- Druk de batterij naar beneden zoals aangeven in de tekening, de batterij springt dan naar voren.



• RIB Circuit Board

CN15: from RIBBON



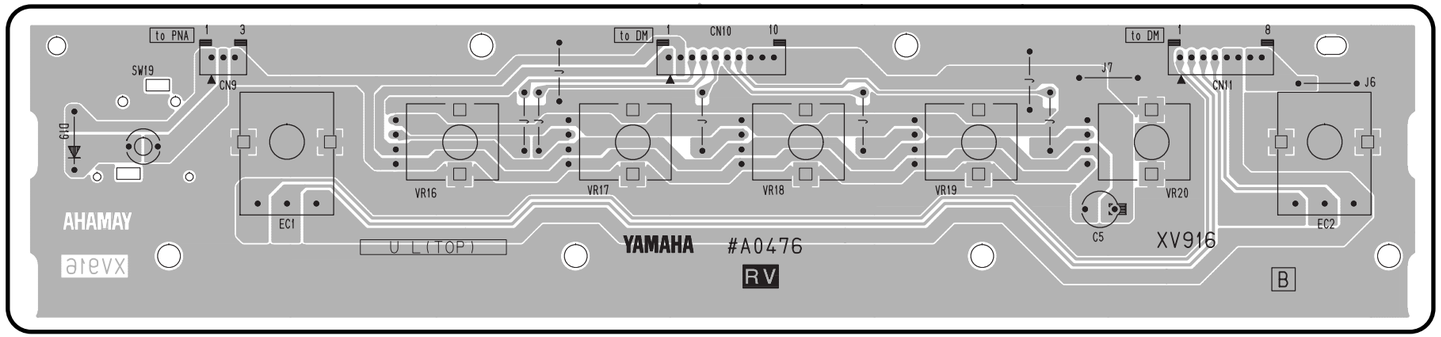
CN14: to DM-CN9

CN14: to DM-CN9

Component side

• RV Circuit Board

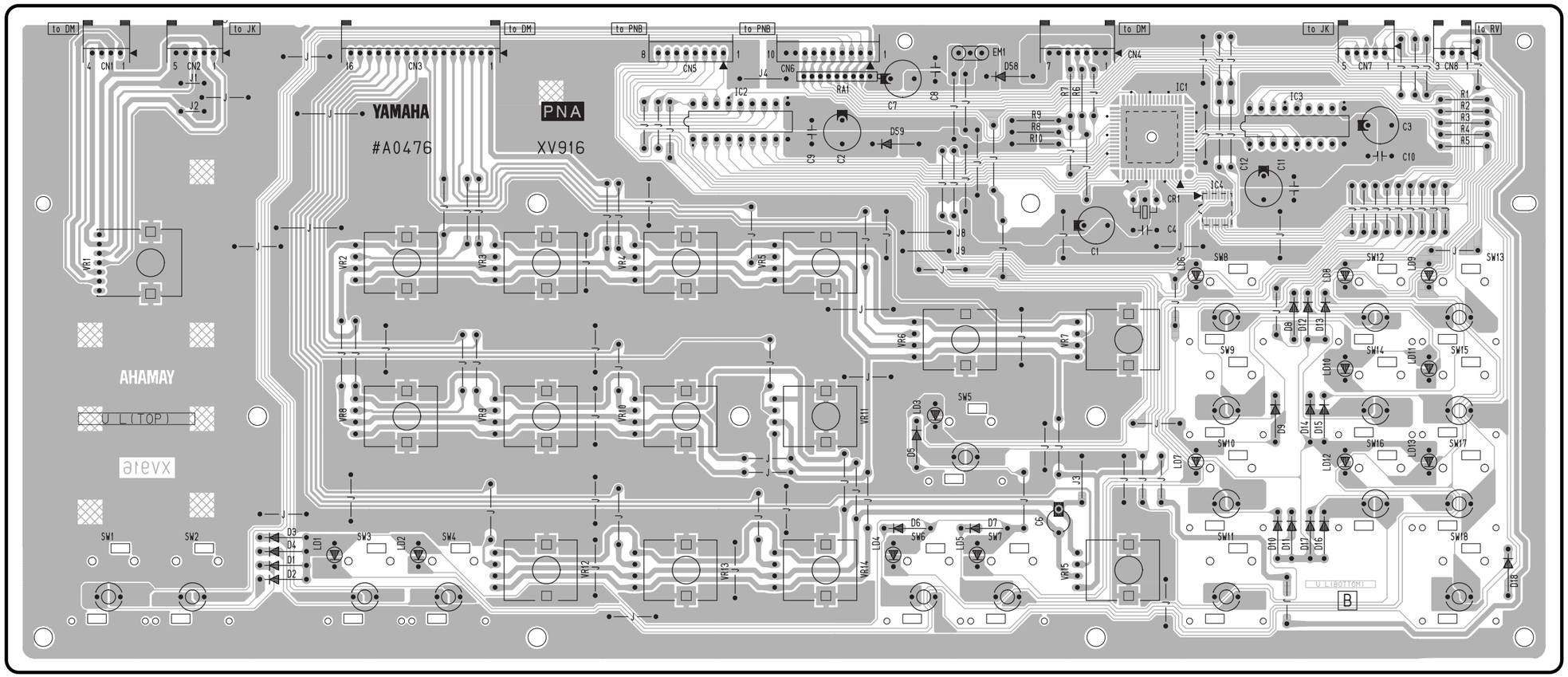
CN9: to PNA-CN8 CN10: to DM-CN6 CN11: to DM-CN14



Component side

• PNA Circuit Board

CN1: to DM-CN19 CN2: to JK-CN1 CN3: to DM-CN7 CN5: to PNB-CN12 CN6: to PNB-CN13 CN4: to DM-CN17 CN7: to JK-CN6 CN8: to RV-CN9

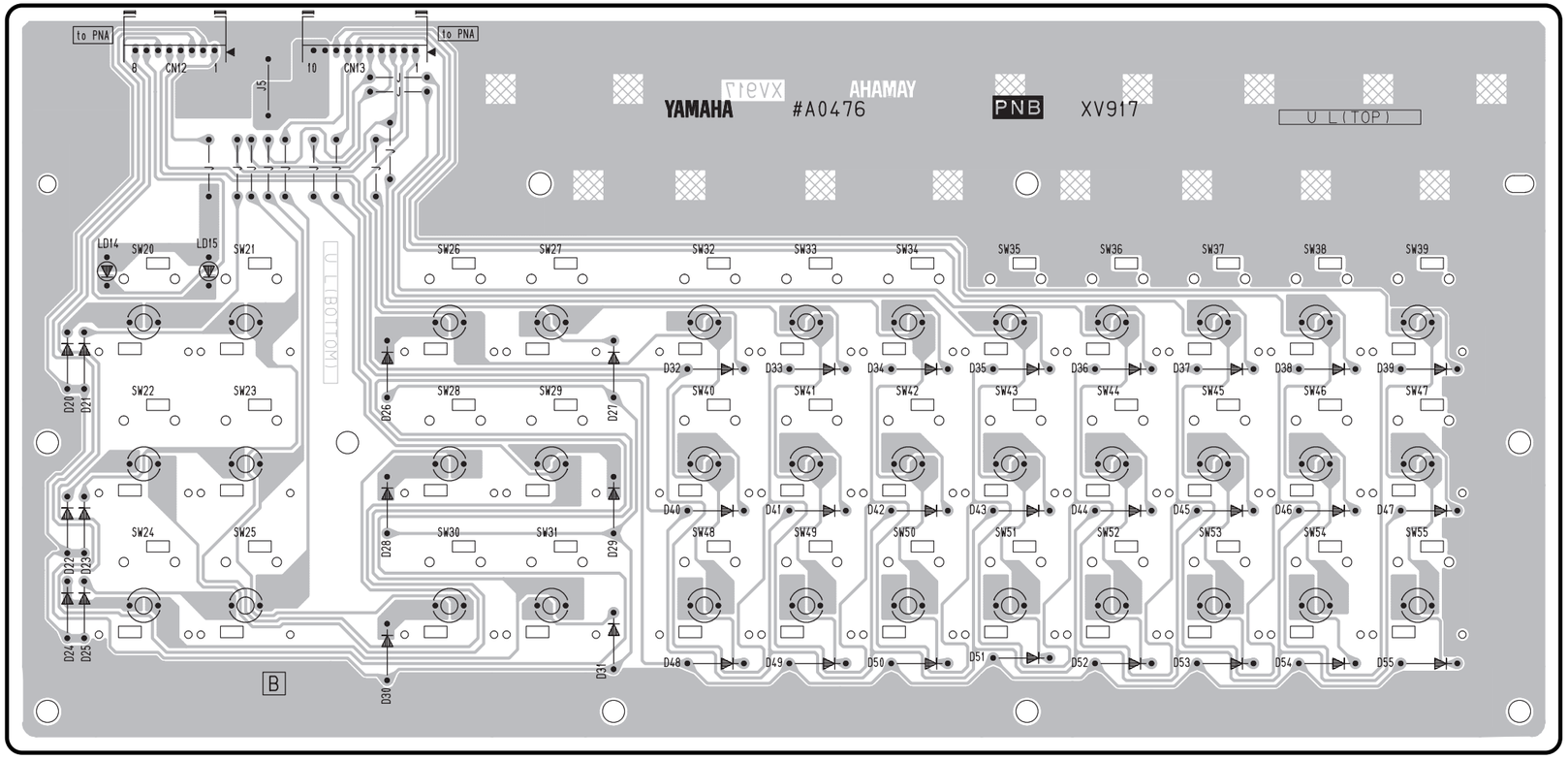


Component side

RIB, RV, PNA: 2NA-V357940 ⚠1

• PNB Circuit Board

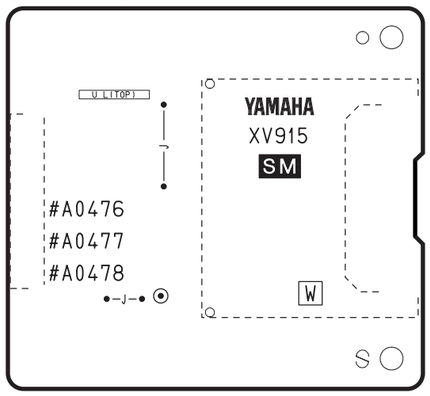
CN12: to PNA-CN5 CN13: to PNA-CN6



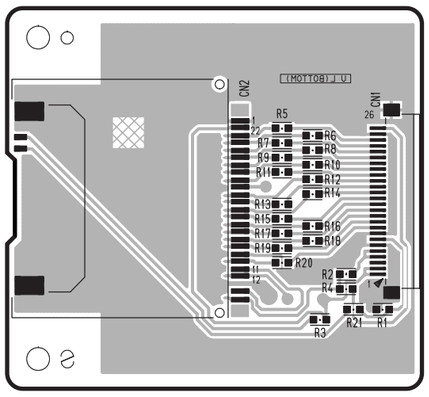
Component side

• SM Circuit Board

CN1: to DM-CN22



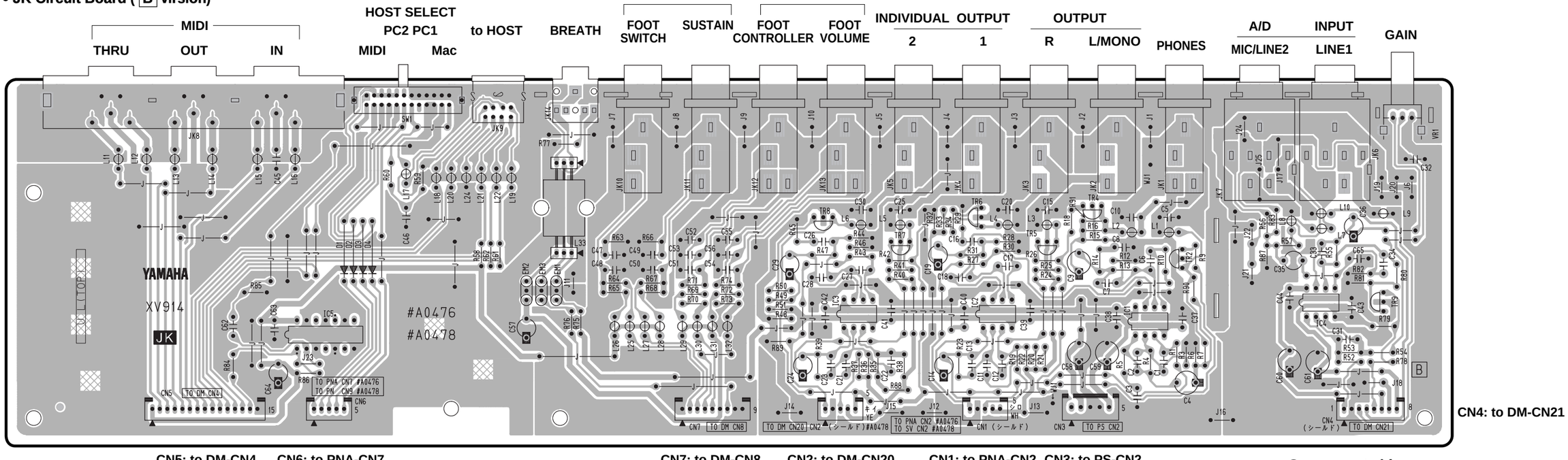
Component side



Pattern side

PNB: 2NA-V357980 ⚠1
SM: 2NA-V357710 ⚠1

• JK Circuit Board (B virsion)

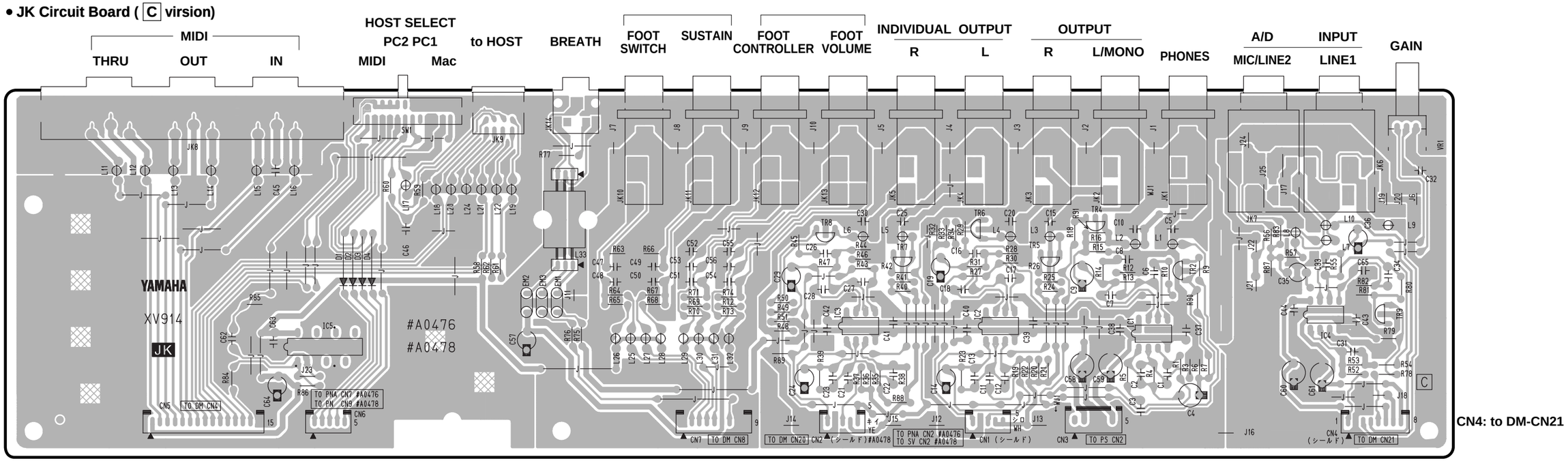


CN4: to DM-CN21

CN5: to DM-CN4 CN6: to PNA-CN7 CN7: to DM-CN8 CN2: to DM-CN20 CN1: to PNA-CN2 CN3: to PS-CN2

Component side

• JK Circuit Board (C virsion)



CN4: to DM-CN21

CN5: to DM-CN4 CN6: to PNA-CN7 CN7: to DM-CN8 CN2: to DM-CN20 CN1: to PNA-CN2 CN3: to PS-CN2

Component side

JK: 2NA-V357700 ⚠1

TEST PROGRAM

Test No.	Test Item	Test Conditions, Judgment Criteria, etc.
T1	RAM READ/WRITE	OK/NG, (MAIN SRAM/WAVE DRAM)
T2	RAM BATTERY	OK/NG, 2.7V or more, Less than 3.5V
T3	WAVE ROM	OK/NG
T4	LCD	ON/OFF blinking alternately
T5	PANEL SWITCH/LED	OK/NG
T6	ENCODER	OK; 0 to +127(0) to -127
T7	KEYBOARD	OK, KEY CODE/KEY TOUCH
T8	KNOB A-2	OK/NG, 64-127-0-64
T10	KNOB 1-4	OK/NG, 64-127-0-64
T11	KNOB 5-14	OK/NG, 64-127-0-64
T12	CONTROLLER	OK/NG, 64-127-0-64 (PB), 0-127-0 (MW), 0-107-0 (AT)
T13	FOOT CONTROL SWITCH	OK, 0-127-0
T14	BREATH CONTROLLER	OK/NG, 127-0-127
T15	CARD	OK/NG
T16	MIDI IN/OUT/THRU	OK/NG THRU Confirmation
T17	HOST SELECT	OK/NG
T18	TO HOST	OK/NG
T19	1 kHz OUTPUT L	OUTPUT(L): +6.0 ± 2 dBm; OUTPUT(R): Less than -72.0 dBm (10 kohm load) INDIV(1): +6.0 ± 2 dBm; INDIV(2): Less than-72.0 dBm (10 kohm load) PHONES(L): +5.0 ± 2 dBm; PHONES(R): Less than -64.0 dBm (33 ohm load)
T20	1 kHz OUTPUT R	OUTPUT(L): Less than -72.0 dBm (10 kohm load); OUTPUT(R): +6.0 ± 2 dBm INDIV(1): Less than -72.0 dBm (10 kohm load); INDIV(2): +6.0 ± 2 dBm PHONES(L): Less than -64.0 dBm (33 ohm load); PHONES(R): +5.0 ± 2 dBm
T21	A/D LEVEL, JACK	OK
T22	A/D -> D/A	OUTPUT (L, R): +15.0 ± 2 dBm (Line) (10 kohm)
T23	PLUG- IN1	OUTPUT (L, R): +11.5 ± 2 dBm (10 kohm)
T24	PLUG- IN2	OUTPUT (L, R): +11.5 ± 2 dBm (10 kohm)
T25	mLAN	OK/NG
T26	FACTORY SET	OK/NG Initialized state
T27	SWP CH	1 kHz, sine wave
T28	EXIT (NOISE LEVEL)	OUTPUT (L, R): Less than -82.0 dBm (10 kohm load) PHONES (L, R): Less than -85.0 dBm (33 ohm load)

Measuring instruments: frequency counter, oscilloscope, AC voltmeter (JIS-C curve type), distortion meter (with flat filter), keyboard amplifier, etc.

Jigs: MIDI cable, specially designed expansion board, etc.

A. HOW TO ENTER THE TEST PROGRAM

While pressing the [VOICE], [PERFORM] and [STORE] switches, turn on the [POWER ON/OFF] switch. The following message will then appear.

```
[EDIT]:AUTO  [JOB ]:MANUAL     [EXIT]:Exit
TEST 476) IntV#.## ExtV#.##    [CARD]:F.SET
```

In this state, pressing the [EXIT] switch will cancel the test mode and restore the normal state.

B. PROCEEDING THROUGH THE TEST PROGRAM

AUTO MODE:
When the test program is started, the following display will appear.

```
01: RAM R/W                        [EXIT]:Exit
TEST 476) IntV#.## ExtV#.##     AUTO MODE
```

Select the test number using the [DEC/NO] and [INC/YES] switches.
Press the [ENTER] switch to execute the tests one after another starting from the currently selected number.
If the test result is "OK", the next test will be selected and executed sequentially.
If an error occurs, an error message will appear and the test will be discontinued.
After pressing the [EXIT] switch, choose an appropriate measure to deal with the error by using the [ENTER], [INC/YES] or [EXIT] switch.
Pressing the [ENTER] switch, will automatically execute the test from where the error occurred.
Pressing the [INC/YES] switch, the test will automatically restart at the test following the one where the error occurred.
Pressing the [EXIT] switch, will execute "T28 EXIT" and the testing will come to an end.

MANUAL MODE:
When the test program is started the following display will appear.

```
01: RAM R/W                        [EXIT]:Exit
TEST 476) IntV#.## ExtV#.##     MANUAL MODE
```

Select the test number using the [DEC/NO] and [INC/YES] switches.
Press the [ENTER] switch to execute the currently selected test.
After the test, press the [EXIT] switch to set to standby mode.
When the [EXIT] switch is pressed again, "T28 EXIT" will be executed.

C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED

When the test result has been judged as "NG" in each of the following tests, choose whether to execute the same test or to proceed to the next test.

AUTO MODE:
Press the [EXIT] switch to set to the error processing state.
MANUAL MODE:
Press the [EXIT] switch to set to the next test number.
This procedure, however, is not applicable to the "T5 PANEL SWITCH" test.

T1. RAM READ/WRITE

```
01: RAM R/W
```

This test is used to check the write/read/verify functions of the main CPU SRAM.

DISPLAY OF RESULTS

OK

```
01: RAM R/W                SRAM              OK
```

NG

```
01: RAM R/W                SRAM              NG
                             NG
```

TEST END

The test ends after the result is displayed.

OTHER

All RAM data are stored in the memory.

T2. RAM BATTERY

```
02: RAM Battery
```

This test checks if the RAM backup battery voltage is within the range of 2.7 V to 3.5 V.

DISPLAY OF RESULTS

OK

```
02: RAM Battery                            OK
```

OK

```
02: RAM Battery                            OK
```

OK

```
02: RAM Battery                       High NG
                                        #.#V
```

TEST END
The test ends after the result is displayed.

T3. WAVE ROM

```
03: Wave ROM
```

This test compares each wave ROM data.

DISPLAY OF RESULTS

OK
```
03: Wave ROM  IC45 IC43 IC46 IC44      OK
                OK   OK   OK   OK
```

NG
```
03: Wave ROM  IC45 IC43 IC46 IC44      NG
                OK   OK   NG   OK
```

If any IC is NG, the test result will be NG.

TEST END
The test ends after the result is displayed.

T4. LCD

```
04: LCD Blink
```

This test is used to check that all dots on the LCD blink on and off alternately at approximately 1 second intervals and that the back light of the LCD lights up.

TEST END
AUTO MODE:
Press the [+1] switch to end the test and proceed to the next test.
MANUAL MODE:
Press the [EXIT] switch to end the test, the initial display will appear and the next test number will be set.

T5. PANEL SWITCH/LED

```
05: Panel Switch/LED
```

This test checks that all switches function properly when the panel switches are turned on and off according to the instructions displayed. If the switch is connected to the LED, it also checks that the corresponding LED lights up.

```
05: Panel Switch/LED
Push   [xxxxxxxx]
```

xxxxxxxx: SWITCH NAME

If the test result is satisfactory, the sine wave is output while the switch is on and the test will proceed to checking the next switch.

If the wrong switch is pressed, "NG" will appear and no sine wave will be output.
If the correct switch is pressed after that, testing will proceed to the next switch.
If the test results for all switches are satisfactory, "OK" will appear.
The switches are checked in the following order.
[VOICE]>[PERFORM]>[STORE]>[UTILITY]>[CARD]>[SEQ]>[EDIT]>[JOB]>[PLAY/STP]>[SHIFT]>[EF.BYPS]>[MASTER]>[EXIT].[ENTER]>[DEC/NO]>[INC/YES]>[PRE1]>[PRE2]>[INT]>[EXT]>[PLG1]>[PLG2]>[Q.ACCESS]>[A]>[B]>[C]>[D]>[E]>[F]>[G]>[H]>[1]>[2]>[3]>[4]>[5]>[6]>[7]>[8]>[9]>[10]>[11]>[12]>[13]>[14]>[15]>[16]

DISPLAY OF RESULTS

OK
```
05: Panel Switch/LED                   OK
```

NG
```
05: Panel Switch/LED                   NG
Push   [xxxxxxxx]
```

TEST END
If the test results of all switches are satisfactory, "OK" will appear and testing will end.

T6. ENCODER

```
06: Encoder
```

While turning the JOG first clockwise and then counterclockwise (-32), according to the LCD instruction as shown below, check that the number increases and decreases sequentially and that "OK" appears as the result.

```
06: Encoder     Page:yyyy Data:yyyy
                     xxxx      xxxx
```

yyyy: target value ("OK" appears after checking.)
xxxx: current value

DISPLAY OF RESULTS

OK
```
06: Encoder     Page:OK   Data:OK      OK
                     xxxx      xxxx
```

NG (No change in the message on the display)

TEST END
The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T7. KEYBOARD

```
07: Keyboard
```

This test is used to check that the keyboard functions properly by scaling 88 keys from A1 to C7.

```
07: Keyboard
Push C 1                    Velocity =xxxx
```

(The above shows the C1 check.)

xxxx: velocity value of the key being pressed

When the key on the LCD display works at a velocity of 0X10 to 0X6F, it is considered normal and that keys note is output. The test will then proceed to the next key test. If a wrong key is played, "NG" will appear and that note's sound will not be output. If a correct key is played after that, however, the test will proceed to the next key test. If the test results of all the keys are satisfactory, "OK" will appear on the LCD display.

DISPLAY OF RESULTS

OK

```
07: Keyboard                                OK
Push C 1                    Velocity =xxx
```

NG

```
07: Keyboard                                NG
Push C 1                    Velocity =xxx
```

TEST END

If the test results of all the keys are satisfactory, "OK" will appear and testing will end.

When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T8. A. KNOB A-2

```
08: KnobA-2
```

Move each knob gradually in the following order: Center 64 (63-65); Left 127 (126-127); Right 0 (0-1); Center 64 (63-65), according to the instruction on the LCD as shown below. Check that the numbers change sequentially and that "OK" appears as the result.
Begin the check from the specified knob. The mark [>] will appear to the left of the value of the knob being checked.

```
08: KnobA-2    >A  >B  >C  >1  >2       yyy
               >yyy yyy>yyy yyy yyy
```

xxx: current knob value
yyy: next target value

DISPLAY OF RESULTS

OK

```
08: KnobA-2    >A  >B  >C  >1  >2        OK
                OK  OK  OK  OK  OK
```

NG (No change in the message on the display)

TEST END

The test ends after the results have been displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T10. A. KNOB1-4

```
10: Knob1-4
```

Move each knob gradually in the following order: Center 64 (63-65); Left 127 (126-127); Right 0 (0-1); Center 64 (63-65), according to the instruction on the LCD as shown below. Check that the numbers change sequentially and that "OK" appears as the result.
Begin the check from the specified knob. The mark [>] will appear to the left of the value of the knob being checked.

```
10: Knob1-4          >COF>RES>REV>CHO   yyy
                     >xxx xxx xxx xxx
```

xxx: current knob value
yyy: next target value

DISPLAY OF RESULTS

OK

```
10: Knob1-4          >COF>RES>REV>CHO    OK
                       OK  OK  OK  OK
```

NG (No change in the message on the display)

TEST END

The test ends after the results have been displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T11. A. KNOB 5-14

```
11: Knob5-14
```

Move each knob gradually in the following order: Center 64 (63-65); Left 127 (126-127); Right 0 (0-1); Center 64 (63-65), according to the instruction on the LCD as shown below. Check that the numbers change sequentially and that "OK" appears as the result.
Begin the check from the specified knob. The mark [>] will appear to the left of the value of the knob being checked.

```
11: Knob5-14  Move Knob[zzz]          yyy
>xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx
```

x x x: current knob value
y y y: next target value
ZZZ: name of the Knob being checked
Checking order: [ATK][DCY][SUS][REL][POR][PCH][SCN][PAN][ARP][TMP]

DISPLAY OF RESULTS

OK

```
11: Knob5-14  Move Knob[zzz]           OK
> OK  OK  OK  OK  OK  OK  OK  OK  OK  OK
```

NG (No change in the message on the display)

TEST END

The test ends after the results have been displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T12. CONTROLLER

```
12: Controller
```

x x x: current knob value

Move the PITCH BENDER, MODULATION WHEEL, RIBBON and AFTER TOUCH controllers according to the instructions on the LCD as described below. Check that the numbers change sequentially and that "OK" appears as the result.

PITCH BENDER: move this controller in the following order: Center (63-65); Up (126-127); Down (0-1); Center (63-65).

RIBBON: move this controller in the following order: Left (6-11); Right (103-108); Left(6-11); and then release it at (122-127).

MODULATION WHEEL: move this controller in the following order: Right (0-1); Up (126-127); Down (0-1).

AFTER TOUCH: operate this controller in the following order: Release (0-5); Push (104-109); and Release (0-5).

```
12: Controller        PB  MW> RB  AT  yyy
                     >xxx xxx xxx xxx
```

x x x: current controller value
y y y: next target value

DISPLAY OF RESULTS

OK

```
12: Controller        PB  MW> RB  AT   OK
                     xxx xxx xxx xxx
```

NG (No change in the message on the display)

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T13. FOOT CONT, SW

```
13: Foot Cont, SW
```

Operate the FOOT VOLUME, FOOT CONTROLLER, SUSTAIN SWITCH and FOOT SWITCH according to the instruction on the LCD as described below. Check that the numbers change and that "OK" appears as the result.

Release 0 (0-2); Push In 127 (125-127); and Release 0 (0-2).
Turn On (0) and Off (1) the SUSTAIN SWITCH and FOOT SWITCH.
FOOT VOLUME: Release (0-2); Push In (125-127); Release (0-2)
FOOT CONTROLLER: same as the above
SUSTAIN SWITCH: On (0); Off (1)
FOOT SWITCH: same as the above

```
13: Foot Cont, SW     FV  FC SUS  FS   0
                     xxx xxx   x   x
```

x x x: current controller value
y y y: next target value

DISPLAY OF RESULTS

OK

```
13: Foot Cont, SW     FV  FC SUS  FS  OK
                     OK  OK  OK  OK
```

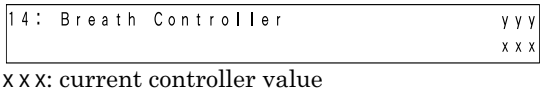
NG (No change in the message on the display)

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T14. BREATH CONTROLLER

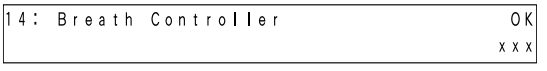
xxx: current value of the breath controller
Operate the breath controller in the following order: Not blowing (122-127) - Blowing (0-5) - Not blowing (122-127) - Not blowing - Blowing - Not blowing, remove the jack when "EXTRACT PLUG!" appears on the LCD. At this time, check that the plug is not plugged in, the numbers change sequentially and that "OK" appears on the LCD. (The test is "OK" when the value is 34 or less.)



xxx: current controller value
yyy: next target value

DISPLAY OF RESULTS

OK

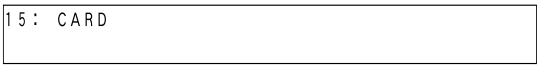


NG (No change in the message on the display)

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T15. CARD

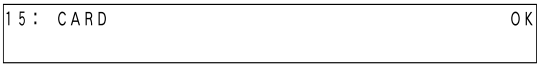


Load SMART MEDIA with its protect function turned off, and then execute the test.
If SMART MEDIA is loaded with its protect function turned on the WRPRT error message will appear.

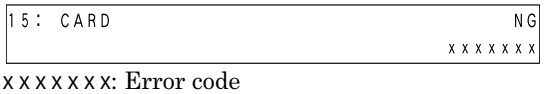
Perform the FORMAT/WRITE/READ/VERIFY check on SMART MEDIA and check that "OK" appears as the result.
Unload SMART MEDIA and check that "NO-CARD" appears on the LCD.

DISPLAY OF RESULTS

OK



NG



xxxxxxx: Error code

ERROR CODE
RD/WR: read/write error
NO-CARD: card is not loaded
WRPRT: write protect

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

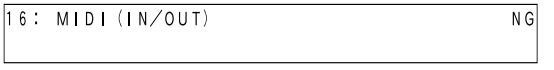
T16. MIDI IN/OUT/THRU

Connect a MIDI cable to MID IN and OUT, and then begin testing.
If the IN and OUT check results are "OK", connect the MIDI monitor with THRU and check that the test pattern (AA・FF・00・55) is output.

DISPLAY OF THE RESULTS

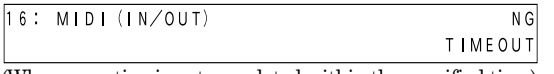
OK

NG



(When different data has been received)

NG



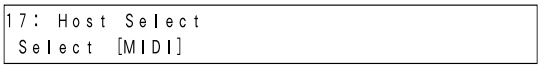
(When reception is not completed within the specified time)

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T17. HOST SELECT

Move the HOST SELECT switch according to the instructions on the LCD, and check that "OK" appears as the result.



When the switch activates properly, a sine wave will be output.
If the switch is initially at the MIDI position, move it to any other position and then return it to the MIDI position.

DISPLAY OF RESULTS

OK

```
19: PCM SIN 1kHz L                    ON
```

NG (No change in the message on the display)

TEST END

When the test results of all switches are satisfactory, "OK" will appear on the LCD and the testing will end.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T18. TO HOST

```
20: PCM SIN 1kHz R
```

Connect pin No.3 to pin No.5, and connect pin No.6 to No.8, and then execute testing.
Operate the HOST SELECT switch according to the instruction on the LCD and check that "OK" appears when [MIDI] is reached at the end.
When the HOST SELECT switch is set to the MIDI position, the "SET HOST Sw [MAC]" message will appear. Next set the HOST SELECT switch of the main unit to MAC to begin testing.

DISPLAY OF RESULTS

OK

```
20: PCM SIN 1kHz R                    ON
```

NG

```
17: Host Select                       OK
```

(When unexpected data is received)

NG

```
18: To Host
```

(When reception is not completed within the specified time)

TEST END

The test ends after the result is displayed.
When the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T19. 1kHz OUTPUT-L

```
18: To Host                           OK
```

Insert plugs into OUTPUT-L, OUTPUT-R, INDIV-1, INDIV-2, PHONES (L), and PHONES (R), and then connect the frequency counter, oscilloscope and AC voltmeter (with a JIS-C filter).

Set the master volume to Max and check that the following signals are output from OUTPUT-L, INDIV-1 and 2, and PHONES (L).
OUTPUT-L: 1 kHz ±1.5 Hz, sine wave, +6.0 ±2 dBm (10k ohm load)
OUTPUT-R: -72 dBm or less (10 kohm load)
INDIV-1: 1 kHz ±1.5 Hz, sine wave, +6.0 ±2 dBm (10 kohm load)
INDIV-2: -72 dBm or less (10 kohm load)
PHONES (L): 1 kHz, sine wave, +5.0 ± 2 dBm (33 ohm load)
PHONES (R): -64 dBm or less (33 ohm load)
While sound is being output, the following message appears on the LCD.

```
18: To Host                           NG
```

DISPLAY OF RESULTS

TEST END

AUTO: when the [INC] switch is pressed, the sound output will stop and the next test will be executed.
MANUAL: when the [EXIT] switch is pressed, testing will end, the initial display will be restored and the next test number will be set.

T20. 1kHz OUTPUT-R

```
18: To Host                           NG
                                  TIMEOUT
```

Insert plugs into OUTPUT-L, OUTPUT-R, PHONES (L), and PHONES (R), and then connect the oscilloscope and AC voltmeter (with a JIS-C filter).
Set the master volume to the Max position.
Check that signals are output at OUTPUT-L, OUTPUT-R, PHONES (L), and PHONES (R) as described below. At this time, signals are output at MEL for mLAN as well.

OUTPUT-L: -72 dBm or less (10k ohm load)
OUTPUT-R: 1 KHZ ±1.5 Hz, sine wave, +6.0 ±2 dBm (10k ohm load)
INDIV-1: -72 dBm or less (10k ohm load)
INDIV-2: 1 kHz ±1.5 Hz, sine wave, +6.0 ±2 dBm (10k ohm load)
PHONES (L): -64 dBm or less (33 ohm load)
PHONES (R): 1 kHz, sine wave, +5.0 ±2 dBm (33 ohm load)
While sound is output, the following message appears on the LCD.

```
19: PCM SIN 1kHz L
```

DISPLAY OF RESULTS

TEST END

AUTO: when the [INC] switch is pressed, the sound output will stop and the next test will be executed.
MANUAL: when the [EXIT] switch is pressed, testing will end, the initial display will be restored and the next test number will be set.

T21. A-D LEVEL, JACK

```
21: A/D Level
```

Set the A/D GAIN volume to the maximum level.
Input a 1 kHz sine wave of the following level through the A/D input port according to the instructions on the LCD.
MIC: -40 dBm ±0 dBm LINE: -6 dBm ±0 dBm

When a plug is connected to the jack, both "EXTRACT PLUG" appears and the A/D level appear.
When a plug is not connected and the level is 2 or lower, "INSERT PLUG" appears and when a plug is inserted, the A/D level will be indicated.
"OK" will appear when the AD level is within the following range.
MIC: 75 or greater and 85 or less
LINE: 75 or greater and 85 or less
When MIC is OK, the LINE check will be executed automatically.

```
21: A/D Level
LINE                                    xxx
```

xxx, yyy display

DISPLAY OF RESULTS

OK

```
21: A/D Level                           OK
```

NG

```
21: A/D Level                           NG
                                  MIN_LEVEL
```

TEST END

When the [EXIT] switch is pressed, the sound output will stop and the next test number will be set.
For the procedure to take when the test result is "NG", refer to "C. TEST SELECTION WHEN AN ERROR HAS BEEN DETECTED".

T22. A/D -> D/A

```
A/D -> D/A      Gain
```

This test is used to check the signal passage from the A/D input to the D/A output.
(GAIN is set to LINE 1 in the initial settings.)
Input a 1 kHz ±5 Hz, -6.0 dBm ±0 dBm sine wave signal to each signal passage through the A/D input in the order described below. Check that the output level specified below is obtained at the output L and R respectively.
Set the A/D INPUT VOLUME knob to the Max position.

```
A/D -> D/A      Gain
                LINE1
```

LINE 1, LINE 2, MIC 1 and MIC 2 can be selected by using [DEC] and [INC].
With LINE 1, GAIN = LINE applies and the signal input through the A/D will be output at the D/A as is.
With LINE 2, GAIN = LINE applies and the level of the signal input through the A/D will be lowered to the specification of the main unit (-12dB) and then output at the D/A.
With MIC 1, GAIN = MIC applies and the signal input through the A/D will be output at the D/A as is.
With MIC 2, GAIN = MIC applies and the level of the signal input through the A/D will be lowered to the specification of the main unit (-12dB) and then output at the D/A.

When GAIN = Line 1, move the A/D INPUT VOLUME knob and check that the sound volume varies.

OUTPUT-L: 1 kHz ±5 Hz, sine wave, +15.0 ±2 dBm (10k ohm load) (Distortion: 1.00% or less)
OUTPUT-R: 1 kHz ±5 Hz, sine wave, +15.0 ±2 dBm (10k ohm load) (Distortion: 1.00% or less)

TEST END

When the [EXIT] switch is pressed, the sound output will stop and the next test number will be set.

T23. PLUG-IN1
T24. PLUG-IN2

```
23: Plug-In1
```

Connect the HARMONY PLUG-ON boarding into the PLUG-IN 1 slot.
After checking the connection of the PLG-IN 1 slot, the signal transmission and reception of the CONTROL LINE, and the IN/OUT of the MIDI LINE and MEL LINE, check to ensure that the output level specified below is obtained at output L and R respectively.
Set the MASTER VOLUME knob to the Max position.

OUTPUT-L: 1 kHz ±5 Hz, sine wave, +11.5 ±2 dBm (10k ohm load) (Distortion: 1.00% or less)
OUTPUT-R: 1 kHz ±5 Hz, sine wave, +11.5 ±2 dBm (10k ohm load) (Distortion: 1.00% or less)

DISPLAY OF RESULTS

OK (No change in the message on display)

NG

```
23: Plug-In1                            NG
                                  NO_BOARD
```

xxxxxxx: Error code

Error code
NG-BOARD: a board other than the VH board is loaded.

NO-BOARD: board is not loaded.
CONTROL: CONTROL line failure

TEST END
When the [EXIT] switch is pressed, the sound output will stop and the next test number will be set.

T25. mLAN

```
25: mLAN
```

Connect the mLAN board to the mLAN slot and execute testing.
After checking the connection of the mLAN board, the signal transmission and reception of the MIDI line, the RESET request signal, and the operation of OUT + SWP30 of the MEL line by the external clock, check that "OK" appears. Also, confirm that a 900 Hz sine wave output is obtained as the final signal at OUTPUT L and R.

DISPLAY OF RESULTS
OK

```
25: mLAN                    OK
```

NG

```
25: mLAN                    NG
                        xxxxxxxx
```

xxxxxx: Error code

Error code
NO-BOARD: board is not loaded.
RESET: errror in the reset request signal check
MIDI: MIDI line failure
MEL: MEL OUT line failure

TEST END
When the [EXIT] switch is pressed, the sound output will stop and the next test number will be set.

T26. FACTORY SET

```
26: Factory Set
```

This test is used to restore the factory settings.
When the test is executed, the following message will appear on the LCD.

```
26: Factory Set
     [NO] or [YES] ?
```

Pressing [YES] will restore the factory settings.
Pressing [NO] will not restore the factory settings.

When the test ends properly, the sine wave sound is output momentarily.

DISPLAY OF RESULTS
When the factory settings are restored
OK

```
26: Factory Set             OK
```

When the factory settings are not restored
NG

```
26: Factory Set             NO SET
```

TEST END
The test ends after the result is displayed.

FACTORY SETTING DATA

After the factory settings are restored, the following data will be set.

SYSTEM SETUP

SYSTEM SETUP	Initial valuse of the MIDI DATA specification
INTERNAL VOICE	FACTORY SET VOICE
INTERNAL PERFORMANCE	FACTORY PERFORMANCE
MODE	VOICE MODE
VOICE	PRE1 A01(1)

T27. SWP Ch

```
27: SWP Ch
```

From OUTPUT-L, the sound output is repeated until the EXIT switch is pressed via the SWP64Ch on the Master side to the L channel and via the SWP64Ch on the Slave side to the R channel.
Connect the plugs to OUTPUT-L and R. Observe the output waveform using the oscilloscope to check that the level of all channels is within the below specified range.
Set the master volume to the Max position.

OUTPUT-L: 1 kHz ±1.5 Hz, sine wave
OUTPUT-R: 2 kHz ±1.5 Hz, sine wave
Also, the following message appears on the LCD during sound output.

```
27: SWP Ch          Mode            Chxxx
                      64
```

xxx: Sound outputting channel no.
Either 64 or 128 can be selected for the mode.

TEST END
AUTO: when the [EXIT] switch is pressed,the sound output will stop.
MANUAL: when the [EXIT] switch is pressed,the sound output will stop and the mode select standby state will be set. When the EXIT switch is pressed twice more, testing will end.

T28. EXIT

```
28: Exit
```

When testing is executed, the following message will appear on the LCD.

```
28: Exit
     [NO] or [YES] ?
```

When [YES] is pressed, testing will end.
When [NO] is pressed, the entry screen for the AUTO and MANUAL modes will be restored.

D. OTHERS

When the test mode is cancelled, the same sequence that occurred when turning on the power will be executed. Check that the on/off clicking noises of the main unit power switch is as described below.

OUTPUT-L, R: Less than 500 mV
INDIV-1, 2: Less than 500 mV
PHONES-L, R: Less than 500 mV
Also, with testing cancelled check the noise level when the voice play mode is set according to the factory settings and no note has been played to confirm that it satisfies the following conditions.
Take measurements with the voltmeter (with JIS-C filter) connected.
OUTPUT-L: Less than -82 dBm (10k ohm load)
OUTPUT-R: Less than -82 dBm (10k ohm load)
INDIV-1: Less than -82 dBm (10k ohm load)
INDIV-2: Less than -82 dBm (10k ohm load)
PHONES-L: Less than -82 dBm (33k ohm load)
PHONES-R: Less than -82 dBm (33k ohm load)

E. Short-cut Functions

(1) Turn on the power while pressing [PRE1] and [PRE2], and forced initialization will be executed.

```
FACTORY SET)
  <<          Executing          >>
```

(2) Turn on the power while pressing [INT] and [EXT], the version will then appear and the operating power will be restored about 5 seconds later.

```
>>>> VERSION = Int:#.## , ExtV#.## <<<<
```

(3) Turn on the power while pressing [EXIT] and [ENTER], and the system program will be loaded from SMART MEDIA and the operating power will be restored.

```
PROGRAM LOAD)
  <<          Executing          >>
```

(4) Turn on the power while pressing [DEC] and [INC], and the wave data will be loaded from SMART MEDIA, and the operating power will be restored.

```
WAVE LOAD)
  <<          Executing          >>
```

MIDI DATA FORMAT

Many MIDI messages listed in the MIDI Data Format section are expressed in hexadecimal or binary numbers. Hexadecimal numbers may include the letter “H” as a suffix. The letter “n” indicates a certain whole number.
The chart below lists the corresponding decimal number for each hexadecimal/binary number.

Decimal	Hexadecimal	Binary
0	00	0000 0000
1	01	0000 0001
2	02	0000 0010
3	03	0000 0011
4	04	0000 0100
5	05	0000 0101
6	06	0000 0110
7	07	0000 0111
8	08	0000 1000
9	09	0000 1001
10	0A	0000 1010
11	0B	0000 1011
12	0C	0000 1100
13	0D	0000 1101
14	0E	0000 1110
15	0F	0000 1111
16	10	0001 0000
17	11	0001 0001
18	12	0001 0010
19	13	0001 0011
20	14	0001 0100
21	15	0001 0101
22	16	0001 0110
23	17	0001 0111
24	18	0001 1000
25	19	0001 1001
26	1A	0001 1010
27	1B	0001 1011
28	1C	0001 1100
29	1D	0001 1101
30	1E	0001 1110
31	1F	0001 1111
32	20	0010 0000
33	21	0010 0001
34	22	0010 0010
35	23	0010 0011
36	24	0010 0100
37	25	0010 0101
38	26	0010 0110
39	27	0010 0111
40	28	0010 1000
41	29	0010 1001
42	2A	0010 1010
43	2B	0010 1011
44	2C	0010 1100
45	2D	0010 1101
46	2E	0010 1110
47	2F	0010 1111
48	30	0011 0000
49	31	0011 0001
50	32	0011 0010
51	33	0011 0011
52	34	0011 0100
53	35	0011 0101
54	36	0011 0110
55	37	0011 0111
56	38	0011 1000
57	39	0011 1001
58	3A	0011 1010
59	3B	0011 1011
60	3C	0011 1100
61	3D	0011 1101
62	3E	0011 1110
63	3F	0011 1111

Decimal	Hexadecimal	Binary
64	40	0100 0000
65	41	0100 0001
66	42	0100 0010
67	43	0100 0011
68	44	0100 0100
69	45	0100 0101
70	46	0100 0110
71	47	0100 0111
72	48	0100 1000
73	49	0100 1001
74	4A	0100 1010
75	4B	0100 1011
76	4C	0100 1100
77	4D	0100 1101
78	4E	0100 1110
79	4F	0100 1111
80	50	0101 0000
81	51	0101 0001
82	52	0101 0010
83	53	0101 0011
84	54	0101 0100
85	55	0101 0101
86	56	0101 0110
87	57	0101 0111
88	58	0101 1000
89	59	0101 1001
90	5A	0101 1010
91	5B	0101 1011
92	5C	0101 1100
93	5D	0101 1101
94	5E	0101 1110
95	5F	0101 1111
96	60	0110 0000
97	61	0110 0001
98	62	0110 0010
99	63	0110 0011
100	64	0110 0100
101	65	0110 0101
102	66	0110 0110
103	67	0110 0111
104	68	0110 1000
105	69	0110 1001
106	6A	0110 1010
107	6B	0110 1011
108	6C	0110 1100
109	6D	0110 1101
110	6E	0110 1110
111	6F	0110 1111
112	70	0111 0000
113	71	0111 0001
114	72	0111 0010
115	73	0111 0011
116	74	0111 0100
117	75	0111 0101
118	76	0111 0110
119	77	0111 0111
120	78	0111 1000
121	79	0111 1001
122	7A	0111 1010
123	7B	0111 1011
124	7C	0111 1100
125	7D	0111 1101
126	7E	0111 1110
127	7F	0111 1111

Additional Notes

For example, 144 - 159(Decimal)/9nH/1001 0000 - 1001 1111(Binary) indicate the note-on messages for the channels 1 through 16 respectively. 176 - 191/BnH/1011 0000 - 1011 1111 indicate the control change messages for the channels 1 through 16 respectively. 192 - 207/CnH/1100 0000 - 1100 1111 indicate the program change messages for the channels 1 through 16 respectively. 240/F0H/1111 0000 is positioned at the beginning of data to indicate a system exclusive message. 247/F7H/1111 0111 is positioned at the end of the system exclusive message.

aaH(Hexadecimal)/0aaaaaaa(Binary) indicates the data addresses. The data address consists of High, Mid and Low.

bbH/0bbbbbbb indicates byte counts.

ccH/0ccccccc indicates tcheck sums.

ddH/0ddddddd indicates data/value.

SYNTHESIZER/SEQUENCER PART

1) TRANSMIT FLOW

```
MIDI <-[SW1]-+---  NOTE ON/OFF            9nH
   OUT |     |
       |     +--- CONTROL CHANGE
       |     |      MODULATION             BnH,01H
       |     |      PORTAMENTO TIME        BnH,05H                 (CS6x only)
       |     |      PAN                    BnH,0AH                 (CS6x only)
       |     |      SUSTAIN SWITCH         BnH,40H
       |     |      PORTAMENTO SWITCH      BnH,41H                 (CS6x only)
       |     |      FILTER RESONANCE       BnH,47H                 (CS6x only)
       |     |      EG RELEASE TIME        BnH,48H                 (CS6x only)
       |     |      EG ATTACK TIME         BnH,49H                 (CS6x only)
       |     |      FILTER CUTOFF FREQ     BnH,4AH                 (CS6x only)
       |     |      EG DECAY TIME          BnH,4BH                 (CS6x only)
       |     |      REVERB SEND            BnH,5BH                 (CS6x only)
       |     |      CHORUS SEND            BnH,5DH                 (CS6x only)
       |     |      ASSIGNABLE CONTROLLER BnH,(00H .. 5FH)
       |     |      FOOT VOLUME            BnH,(07H or 0BH)
       |     |
       |     +-[SW8]--BANK SEL MSB         BnH,00H
       |     |        BANK SEL LSB         BnH,20H
       |     |
       |     |-[SW2]--EG SUSTAIN LEVEL     BnH,1FH                 (CS6x only)
       |     |
       |     +--- PROGRAM CHANGE           CnH
       |     |
       |     +--- CHANNEL AFTER TOUCH      DnH
       |     |
       |     +--- PITCH BEND CHANGE        EnH
       |
       |-[SW3,4]--SYSTEM REALTIME MESSAGE
       |            TIMING CLOCK           F8H
       |
       |-[SW4]---- SYSTEM REALTIME MESSAGE
       |            START                  FAH
       |            CONTINUE               FBH
       |            STOP                   FCH
       |
       |
      +[SW5]-+--- SYSTEM EXCLUSIVE MESSAGE
       |     |
       |     |-[SW6]-SAMPLE DUMP STANDARD
       |     |       DUMP REQUEST          F0H 7EH nnH 03H ssH ssH F7H
       |     |       ACK                   F0H 7EH nnH 7FH ppH F7H
       |     |       NAK                   F0H 7EH nnH 7EH ppH F7H
       |     |       CANCEL                F0H 7EH nnH 7DH ppH F7H
       |     |       WAIT                  F0H 7EH nnH 7CH ppH F7H
       |     |
       |     |-[SW7]-<BULK DUMP>           F0H 43H 0nH 64H bhH blH ahH amH alH ddH....ddH ccH F7H
       |     |
       |     |-[SW7]-<PARAMETER CHANGE>    F0H 43H 1nH 64H ahH amH alH ddH.....ddH F7H
       |
       |---------- SYSTEM EXCLUSIVE MESSAGE
       |            IDENTITY REPLY         F0H 7EH 7FH 06H 02H 43H 00H 41H 2DH 02H 00H 00H 00H 01H F7H
       |
       |---------- ACTIVE SENSING           FEH

[SW1] MIDI Transmit Channel
      Master Keyboard Mode = on: complies with Zone Transmit Channel.
      Master Keyboard Mode = off: complies with Keyboard Transmit Channel.
      The data played back using Sequencer Part will be output through the channels set for
      the sequence data, ignoring [SW1] settings.
      CS6R transmits BC and A-C/1-2 of ASSIGNABLE CONTROLLER, and the data from the
      Sequencer Part. [SW2] MIDI Control Mode
[SW3] MIDI Sync
[SW4] MIDI Control
[SW5] MIDI Device Number
      When set to all, data will be output through the channel 1.
[SW6] PHRASE CLIP MODE JOB only. Not available on S80.
[SW7] In the VOICE MODE, VOICE related data only. In the PERFORMANCE MODE, PERFORMANCE
      related data only.
      SYSTEM data will be transmitted/received in all modes.
[SW8] SYSTEM Bank Select Switch
```

2) RECEIVE FLOW

```
MIDI >-[SW11]+--- NOTE OFF               8nH
       |     |
       |     +--- NOTE ON/OFF            9nH
       |     |
       |     +--- CONTROL CHANGE
       |     |      MODULATION           BnH,01H
       |     |      PORTAMENTO TIME      BnH,05H
       |     |      DATA ENTRY MSB       BnH,06
       |     |      DATA ENTRY LSB       BnH,26H
       |     |      MAIN VOLUME          BnH,07H
       |     |      PAN                  BnH,0AH
       |     |      EXPRESSION           BnH,0BH
       |     |      SUSTAIN SWITCH       BnH,40H
       |     |      PORTAMENTO SWITCH    BnH,41H
       |     |      SOSTENUTO            BnH,42H
       |     |      HARMONIC CONTENT     BnH,47H
       |     |      EG RELEASE TIME      BnH,48H
       |     |      EG ATTACK TIME       BnH,49H
       |     |      BRIGHTNESS           BnH,4AH
       |     |      EG DECAY TIME        BnH,4BH
       |     |      PORTAMENTO CONTROL   BnH,54H
       |     |      EFFECT1 DEPTH        BnH,5BH
       |     |      EFFECT3 DEPTH        BnH,5DH
       |     |      DATA ENTRY INC       BnH,60H
       |     |      DATA ENTRY DEC       BnH,61H
       |     |      ASSIGNABLE CONTROLLER BnH,(00H .. 5FH)
       |     |      RPN
       |     |          PITCH BEND SENS  BnH,64H,00H,65H,00H,06H,mmH
       |     |          FINE TUNING      BnH,64H,01H,65H,00H,06H,mmH,26H,llH   *1
       |     |          COARSE TUNING    BnH,64H,02H,65H,00H,06H,mmH           *1
       |     |          RPN RESET        BnH,64H,7FH,65H,7FH
       |     |      ALL SOUND OFF        BnH,78H
       |     |      RESET ALL CONTROLLERS BnH,79H
       |     |      ALL NOTE OFF         BnH,7BH
       |     |      OMNI MODE OFF        BnH,7CH
       |     |      OMNI MODE ON         BnH,7DH
       |     |      MONO MODE            BnH,7EH
       |     |      POLY MODE            BnH,7FH
       |     |
       |     +-[SW2]--EG SUSTAIN LEVEL   BnH,1FH
       |     |
       |     +-[SW8]--BANK SEL MSB       BnH,00H
       |     |        BANK SEL LSB       BnH,20H
       |     |
       |     +-[SW9]--PROGRAM CHANGE     CnH
       |     |
       |     +--------CHANNEL AFTER TOUCH  DnH
       |     |
       |     +--------PITCH BEND CHANGE   EnH
       |
       |
       +------+   SYSTEM EXCLUSIVE MESSAGE
       |      |      IDENTITY REQUEST     F0H 7EH 0nH 06H 01H F7H
       |      |      REMOTE SWITCH        F0H 43H 10H 64H 0AH 00H alH ddH F7H
       |      |
       |      +-[SW12]- GM MODE ON        F0H 7EH 7FH 09H 01H F7H
       |
       +[SW5]- +   SYSTEM EXCLUSIVE MESSAGE
       |       |   MIDI MASTER VOLUME     F0H 7FH 7FH 04H 01H llH mmH F7H
       |       |
       |       +-[SW6]--SAMPLE DUMP STANDARD
       |       |       DUMP HEADER        F0H 7EH nnH 01H ssH ssH ddH....ddH F7H
       |       |       DATA PACKET        F0H 7EH nnH 02H kkH ddH....ddH ccH F7H
       |       |       CANCEL             F0H 7EH nnH 7DH ppH F7H
       |       |
       |       +-[SW10]-<BULK DUMP>       F0H 43H 0nH 64H bhH blH ahH amH alH ddH....ddH ccH F7H
       |       |
       |       +-[SW7]--<PARAMETER CHANGE>  F0H 43H 1nH 64H ahH amH alH ddH.....ddH F7H
       |       |
       |       +-[SW7]--<BULK DUMP REQUEST>  F0H 43H 2nH 64H ahH amH alH ddH.....ddH F7H
       |       |
       |       +-[SW7]--<PARAMETER REQUEST>  F0H 43H 3nH 64H ahH amH alH F7H
       |       |
       |       +-[SW12]-XG SYSTEM ON      F0H 43H 1nH 4CH 00H 00H 7EH 00H F7H
       |
       +[SW3]---------  SYSTEM REALTIME MESSAGE
       |                TIMING CLOCK      F8H
       |
       +[SW4]---------  SYSTEM REALTIME MESSAGE
       |                START             FAH
       |                CONTINUE          FBH
       |                STOP              FCH
       |
       |
       +--------------  ACTIVE SENSING    FEH


[SW2] MIDI Control Mode
[SW3] MIDI Sync
[SW4] MIDI Control
[SW5] MIDI Device Number
      When set to the number other than off, MIDI MASTER VOLUME will be received.
[SW6] PHRASE CLIP MODE JOB only. Not available on S80.
[SW7] In the VOICE MODE, VOICE related data only. In the PERFORMANCE MODE, PERFORMANCE
      related data only.
      SYSTEM data will be transmitted/received in all modes.
[SW8] SYSTEM Bank Select Switch
[SW9] SYSTEM Program Change Switch (Received only in the Play Mode when Voice Mode or
      Phrase Clip Mode is selected.)
[SW10]SYSTEM Bulk Protect and the conditions mentioned in SW7 above.
[SW11]MIDI Receive Channel and Receive Filter.
      In Performance Mode, complies with Part Receive Channel and Part Receive Switch.
      In the modes other than Performance Mode, complies with Basic Receive Channel.
[SW12]SYSTEM Receive GM/XG On

*1 Performance Mode only.
```

3) TRANSMIT/RECEIVE DATA

(3-1) CHANNEL VOICE MESSAGES

CS6R transmits BC and A-C/1-2 of ASSIGNABLE CONTROLLER, and the data from the Sequencer Part.

(3-1-1) NOTE OFF

STATUS	1000nnnn(8nH)	n = 0 ~ 15 CHANNEL NUMBER
NOTE NUMBER	0kkkkkkk	k = 0 (C-2) ~ 127 (G8)
VELOCITY	0vvvvvvv	ignores "v"

Receive only.

(3-1-2) NOTE ON/OFF

STATUS	1001nnnn(9nH)	n = 0 ~ 15 CHANNEL NUMBER
NOTE NUMBER	0kkkkkkk	k = 0 (C-2) ~ 127 (G8)
VELOCITY	0vvvvvvv(v≠0)	NOTE ON
	0vvvvvvv(v=0)	NOTE OFF

(3-1-3) CONTROL CHANGE

STATUS	1011nnnn(BnH)	n = 0 ~ 15 CHANNEL NUMBER
CONTROL NUMBER	0ccccccc	
CONTROL VALUE	0vvvvvvv	

* TRANSMITTED CONTROL NUMBER

c = 0	BANK SEL MSB	; v = 0,63,127	*3
c = 32	BANK SEL LSB	; v = 0,1,8,9,24,25,32,40,41,64,65	*3
c = 1	MODULATION	; v = 0 - 127	
c = 5	PORTAMENTO TIME	; v = 0 - 127	*4
c = 7	MAIN VOLUME	; v = 0 - 127	
c = 10	PAN	; v = 0 - 127	*4
c = 11	EXPRESSION	; v = 0 - 127	
c = 31	EG SUSTAIN LEVEL	; v = 0:-64 - 64:0 - 127:+63	*4,*5
c = 64	SUSTAIN SWITCH	; v = 0, 127	
c = 65	PORTAMENTO SWITCH	; v = 0-63:OFF , 64-127:ON	*4
c = 71	FILTER RESONANCE	; v = 0:-64 - 64:0 - 127:+63	*4
c = 72	EG RELEASE TIME	; v = 0:-64 - 64:0 - 127:+63	*4
c = 73	EG ATTACK TIME	; v = 0:-64 - 64:0 - 127:+63	*4
c = 74	FILTER CUTOFF FREQ	; v = 0:-64 - 64:0 - 127:+63	*4
c = 75	EG DECAY TIME	; v = 0:-64 - 64:0 - 127:+63	*4
c = 91	REVERB SEND	; v = 0 - 127	*4
c = 93	CHORUS SEND	; v = 0 - 127	*4
c = 0..95	ASSIGNABLE CONTROLLER	; v = 0 - 127	*6

The Sequencer Part will play back all the recorded control change messages.

* RECEIVED CONTROL NUMBER

c = 0	BANK SEL MSB	; v = 0 - 127	*3
c = 32	BANK SEL LSB	; v = 0 - 127	*3
c = 1	MODULATION	; v = 0 - 127	
c = 5	PORTAMENTO TIME	; v = 0 - 127	*2
c = 6	DATA ENTRY MSB	; v = 0 - 127	*1
c = 38	DATA ENTRY LSB	; v = 0 - 127	*1
c = 7	MAIN VOLUME	; v = 0 - 127	
c = 10	PAN	; v = 0 - 127	
c = 11	EXPRESSION	; v = 0 - 127	
c = 31	EG SUSTAIN LEVEL	; v = 0:-64 - 64:0 - 127:+63	*2,*5
c = 64	SUSTAIN SWITCH	; v = 0-63:OFF , 64-127:ON	*2
c = 65	PORTAMENTO SWITCH	; v = 0-63:OFF , 64-127:ON	*2
c = 66	SOSTENUTO	; v = 0-63:OFF , 64-127:ON	*2
c = 71	HARMONIC CONTENT	; v = 0:-64 - 64:0 - 127:+63	
c = 72	EG RELEASE TIME	; v = 0:-64 - 64:0 - 127:+63	
c = 73	EG ATTACK TIME	; v = 0:-64 - 64:0 - 127:+63	
c = 74	BRIGHTNESS	; v = 0:-64 - 64:0 - 127:+63	
c = 75	EG DECAY TIME	; v = 0:-64 - 64:0 - 127:+63	*2
c = 84	PORTAMENTO CONTROL	; v = 0 - 127	*2
c = 91	EFFECT1 DEPTH	; v = 0 - 127	
c = 93	EFFECT3 DEPTH	; v = 0 - 127	
c = 96	DATA ENTRY INC	; v = 127	*1
c = 97	DATA ENTRY DEC	; v = 127	*1
c = 0..95	ASSIGNABLE CONTROLLER	; v = 0 - 127	*6
c = 0..95	ARPEGGIO SW	; v = 0-63:OFF , 64-127:ON	*6
c = 0..95	ARPEGGIO HOLD	; v = 0-63:OFF , 64-127:ON	*6

*1 Used only when a value is set using RPN.
*2 Invalid with Drum Voices.
*3 Relation between BANK CHANGE and PROGRAM is as follows:

CATEGORY		MSB	LSB	PROGRAM No	Displayed on LCD
Normal Voice	Internal	0	0	0..127	(1..128)
Drum Voice	Internal	127	0	0..1	(1..2)
Normal Voice	Preset 1	63	0	0..127	(1..128)
	Preset 2	63	1	0..127	(1..128)
	Internal	63	8	0..127	(1..128)
	External	63	9	0..127	(1..128)
Plug-in Voice	Plug-in 1	63	24	0..63	(1..64)
	Plug-in 2	63	25	0..63	(1..64)
Drum Voice	Preset	63	32	0..7	(1..8)
	Internal	63	40	0..1	(1..2)
	External	63	41	0..1	(1..2)
Performance	Internal	63	64	0..127	(1..128)
	External	63	65	0..63	(1..64)
Phrase Clip	Internal	63	104	0..3	(1..4)

*4 CS6x only.
*5 Transmitted/received only when MODE2 is selected in CONTROL CHANGE MODE.
*6 The default CONTROL NUMBERs of ASSIGNABLE CONTROLLER are as follows:

BREATH CONTROLLER	2	
FOOT CONTROLLER	4	(Transmit: CS6x and S80 only)
SCENE CONTROL	14	(Transmit/Receive: CS6x only)
KNOB 1	16	
KNOB 2	17	
KNOB A	18	
KNOB B	19	
KNOB C	20	
RIBBON CONTROLLER	22	(Transmit: CS6x only)
CONTROL SLIDER	7	(Transmit/Receive: S80 only)
FOOT SWITCH	88	(Transmit: CS6x, S80 only)
ARPEGGIO HOLD	89	(Transmit: CS6x only)
ARPEGGIO SWITCH	90	(Transmit: CS6x only)

PORTAMENTO TIME sets the time it takes for the pitch to reach the next note played when PORTAMENTO SWITCH is set to on.
PAN position relatively changes according to the preset value for each voice.
In PORTAMENTO CONTROL, PORTAMENTO TIME is fixed to 0.
EFFECT1 DEPTH controls reverb send level.
EFFECT3 DEPTH controls chorus send level.
HARMONIC CONTENT adjusts the resonance preset for each voice.
Setting a value adds to or subtracts from the center value, 64, since it is an offset parameter.
The larger the value more resonant sound will be produced. The effective range may be narrower than the range you can designate depending on the selected voice.
The parameters, EG ATTACK TIME, EG DECAY TIME, EG SUSTAIN LEVEL, EG RELEASE TIME adjust the envelopes preset for each voice.
Setting these values add to or subtract from the center value, 64, since these are offset parameters.
BRIGHTNESS adjusts the cutoff frequency preset for each voice.
Setting a value adds to or subtracts from the center value, 64, since it is an offset parameter.
The smaller the value the cutoff frequency will be lowered. The effective range may be narrower than the range you can designate depending on the selected voice.

nk Select will be actually executed when the Program Change message is received.
nk Select and Program Change numbers that are not supported by Yamaha will be
nored.

'ROGRAM CHANGE

STATUS	1100nnnn(CnH)	n = 0 ~ 15 CHANNEL NUMBER
PROGRAM NUMBER	0ppppppp	p = 0 ~ 127

:HANNEL AFTER TOUCH

STATUS	1101nnnn(DnH)	n = 0 ~ 15 CHANNEL NUMBER
VALUE	0vvvvvvv	v = 0 ~ 127 AFTER TOUCH VALUE

'ITCH BEND CHANGE

STATUS	1110nnnn(EnH)	n = 0 ~ 15 CHANNEL NUMBER
LSB	0vvvvvvv	PITCH BEND CHANGE LSB
MSB	0vvvvvvv	PITCH BEND CHANGE MSB

Transmitted with a resolution of 7 bits.

ANNEL MODE MESSAGES

STATUS	1011nnnn(BnH)	n = 0 ~ 15 CHANNEL NUMBER
CONTROL NUMBER	0ccccccc	c = CONTROL NUMBER
CONTROL VALUE	0vvvvvvv	v = DATA VALUE

.LL SOUNDS OFF (CONTROL NUMBER = 78H , DATA VALUE = 0)

All the sounds currently played including the channel messages such as note-on and hold-on in a certain channel are muted when receiving this message.

!ESET ALL CONTROLLERS (CONTROL NUMBER = 79H , DATA VALUE = 0)

Resets the values set for the following controllers.

PITCH BEND CHANGE	0 (center)
CHANNEL AFTER TOUCH	0 (minimum)
MODULATION	0 (minimum)
EXPRESSION	127 (maximum)
BREATH CONTROLLER	127 (maximum)
FOOT CONTROLLER	127 (maximum)
RIBBON CONTROLLER	0 (center)
KNOB 1	0 (center)
KNOB 2	0 (center)
SUSTAIN SWITCH	0 (off)
SOSTENUTO SWITCH	0 (off)
RPN	Not assigned; No change
PORTAMENT CONTROL	Resets the source note number

Doesn't reset the following data:
PROGRAM CHANGE, BANK SELECT MSB/LSB, VOLUME, PAN.
HARMONIC CONTENT, SUSTAIN LEVEL, RELEASE TIME, ATTACK TIME, DECAY TIME, BRIGHTNESS
EFFECT SEND LEVEL 1, EFFECT SEND LEVEL 3, PORTAMENTO SWITCH
PITCH BEND SENSITIVITY, FINE TUNING, COARSE TUNING
ASSIGNABLE CONTROLLER

.LL NOTES OFF (CONTROL NUMBER = 7BH , DATA VALUE = 0)

All the notes currently set to on in certain channel(s) are muted when receiving this message. However, if Sustain or Sostenuto is on, notes will continue sounding until these are turned off.

)MNI MODE OFF (CONTROL NUMBER = 7CH , DATA VALUE = 0)

Performs the same function as when receiving ALL NOTES OFF.
Sets VOICE RECEIVE CHANNEL to "OMNI OFF," channel 1.

)MNI MODE ON (CONTROL NUMBER = 7DH , DATA VALUE = 0)

Performs the same function as when receiving ALL NOTES OFF.
Sets VOICE RECEIVE CHANNEL to "OMNI ON."

/ONO (CONTROL NUMBER = 7EH , DATA VALUE = 0..16)

Performs the same function as when receiving ALL SOUNDS OFF. If the 3rd byte (mono) is within 0 through 16, the channel will be Mode4(m = 1).
In VOICE MODE, the mode can be Mode2(m=1) according to VOICE RECEIVE CHANNEL.

'OLY (CONTROL NUMBER = 7FH , DATA VALUE = 0)

Performs the same function as when receiving ALL SOUNDS OFF. The channel will be Mode3.
In VOICE MODE, the mode can be Mode1 according to VOICE RECEIVE CHANNEL.

GISTERED PARAMETER NUMBER

STATUS	1011nnnn(BnH)	n = 0 ~ 15 CHANNEL NUMBER
LSB	01100100(64H)	
RPN LSB	0ppppppp	p = RPN LSB(Refer to the table as shown below)
MSB	01100101(65H)	
RPN MSB	0qqqqqqq	q = RPN MSB(Refer to the table as shown below)
DATA ENTRY MSB	00000110(06H)	
DATA VALUE	0mmmmmmm	m = Data Value
DATA ENTRY LSB	00100110(26H)	
DATA VALUE	0lllllll	l = Data Value

First, designate the parameter using RPN MSB/LSB numbers. Then, set its value with data entry MSB/LSB.

RPN		D.ENTRY	
LSB	MSB	MSB	LSB PARAMETER NAME DATA RANGE
00H	00H	mmH ---	PITCH BEND SENSITIVITY 00H - 18H (0 - 24 semitones)
01H	00H	mmH llH	MASTER FINE TUNE {mmH,llH}={00H,00H}-{40H,00H}-{7FH,7FH} (-8192*100/8192) - 0 - (+8192*100/8192)
02H	00H	mmH ---	MASTER COARSE TUNE 28H - 40H - 58H (-24 - 0 - +24 semitones)
7FH	7FH	--- ---	RPN RESET RPN numbers will be left not designated. The internal values are not affected.

I-REGISTERED PARAMETER NUMBER

There are no applicable parameters.

TEM REAL TIME MESSAGES

.CTIVE SENSING

STATUS	11111110(FEH)

Transmitted at every 200 msec.
Once this code is received, the instrument starts sensing. When no status nor data is received for over approximately 350 ms, MIDI receiving buffer will be cleared, and the sounds currently played and the sustain switch are forcibly turned off. In this case, each control data will be reset to a certain value.

TEM EXCLUSIVE MESSAGE

NIVERSAL NON REALTIME MESSAGE

-6-1-1)GENERAL MIDI MODE ON

F0H 7EH 7FH 09H 01H F7H

Received only when SYSTEM Receive GM/XG on is set to on in PERFORMANCE MODE. The Part values will be reset according to the SYSTEM Internal Part settings.

(3-6-1-2)IDENTITY REQUEST(Receive only)

F0H 7EH 0nH 06H 01H F7H ("n" = Device No.However, this instrument receives under "omni.")

(3-6-1-3)IDENTITY REPLY (Transmit only)

F0H 7EH 7FH 06H 02H 43H 00H 41H ddH ddH 00H 00H 00H 01H F7H

dd;Device Number Code
CS6x: 5C 03
CS6R: 5D 03
S80: 5E 03

(3-6-2)UNIVERSAL REALTIME MESSAGE

(3-6-2-1) MIDI MASTER VOLUME

F0H 7FH 7FH 04H 01H llH mmH F7H

Sets the MASTER VOLUME value.
The value "mm" is used to set the master volume (the value "ll" should be ignored).

(3-6-3)PARAMETER CHANGE

(3-6-3-1) XG SYSTEM ON

11110000	F0	Exclusive status
1000011	43	YAMAHA ID
0001nnnn	1n	device Number
1001100	4C	Model ID
0aaaaaaa	0	Address High
0aaaaaaa	0	Address Mid
0aaaaaaa	7E	Address Low
0	0	Data
11110111	F7	End of Exclusive

Received only when SYSTEM Receive GM/XG on is set to on in PERFORMANCE MODE. The Part values will be reset according to the SYSTEM Internal Part settings.
Be aware that executing this message takes ca. 170ms and that, therefore, a certain interval before executing the following message is needed.

(3-6-3-2) NATIVE PARAMETER CHANGE, REMOTE SWITCH

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0001nnnn	1n	device Number
01100100	64	Model ID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
0ddddddd	ddddddd	Data
|	|	
11110111	F7	End of Exclusive

For parameters with data size of 2 or more, the appropriate number of data bytes will be transmitted.
See the following MIDI Data Table for Address and Byte Count.
Always received no matter which device number is selected, in the case of REMOTE SWITCH.

(3-6-4)BULK DUMP

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0000nnnn	0n	device Number
01100100	64	Model ID
0bbbbbbb	bbbbbbb	Byte Count
0bbbbbbb	bbbbbbb	Byte Count
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
0	0	Data
|	|	
0ccccccc	ccccccc	Check-sum
11110111	F7	End of Exclusive

See the following MIDI Data Table for Address and Byte Count.
The Check sum is the value that results in a value of 0 for the lower 7 bits when the Byte Count, Start Address, Data and Check sum itself are added.

(3-6-5) DUMP REQUEST

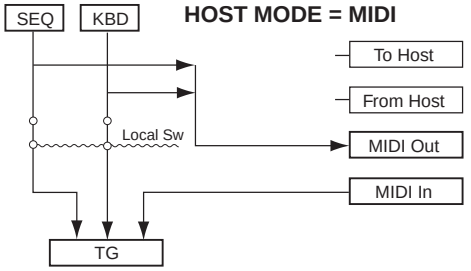
11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0010nnnn	2n	device Number
01100100	64	Model ID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

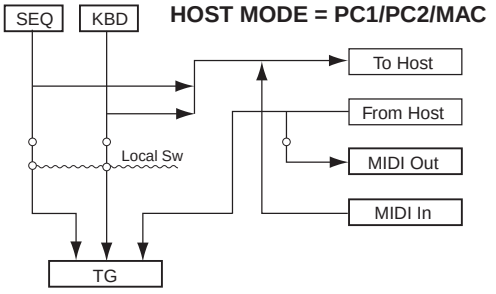
See the following MIDI Data Table for Address and Byte Count.

(3-6-6) PARAMETER REQUEST

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0011nnnn	3n	device Number
01100100	64	Model ID
0aaaaaaa	aaaaaaa	Address Hig
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

See the following MIDI Data Table for Address and Byte Count.





Although three types of note on/note off data, received via MIDI, played by the internal sequencer and played on the keyboard will be distinguished, the other controllers (channel messages) equally affect the entire notes.

ALL SOUNDS OFF clears all the sounds in the specific channel(s) played by both the keyboard and the data via MIDI.
ALL NOTES OFF received via MIDI clears the sounds in the specific channel(s) played via MIDI.

YAMAHA [Music Synthesizer --- synth. part] Date :13-JUL-1999
Model CS6x/CS6R MIDI Implementation Chart Version : 1.0

Function...		Transmitted	Recognized	Remarks
Basic	Default	1 - 16	1 - 16	Memorised
Channel	Changed	1 - 16	1 - 16	
Mode	Default	3	1	Memorised
	Messages	X	1 - 4(m=1) *2	
	Altered	**********	X	
Note		0 - 127 *3	0 - 127	Transpose
Number : True voice		**********	0 - 127	
Velocity	Note ON	O 9nH,v=1-127	O v=1-127	
	Note OFF	X 9nH,v=0	X	
After	Key's	X	X	
Touch	Ch's	O *3	O *1	
Pitch Bend		O *3	O *1	
Control	0,32	O	O *1	Bank Select
Change	1,7,11	O *3	O *1	
	5,10	O *3	O *1	
	6,38	X	O *1	Data Entry
	64	O *3	O *1	Sustain Sw
	65	O *3	O *1	Portamento Sw
	66	X	O *1	Sosutenuto
	71-75	O *3	O *1	Sound Controller
	84	X	O *1	Portamento Cntrl
	91,93	O *3	O *1	Effect Depth
	96-97	X	O *1	RPN Inc,Dec
	100-101	X	O *1	RPN LSB,MSB
	1-95	O	O *1	Assignable Cntrl
Prog		O 0 - 127 *1	O 0 - 127	
Change : True #		**********	0 - 127	
System Exclusive		O	O	
Common : Song Pos.		X	X	
: Song Sel.		X	X	
: Tune		X	X	
System : Clock		X	O	
Real Time : Commands		X	X	
: All Sound Off		X	O (120,126,127)	
Aux : Reset All Cntrls		X	O (121)	
: Local ON/OFF		X	X	
Mes- : All Notes OFF		X	O (123-125)	
sages: Active Sense		O	O	
: Reset		X	X	

Notes: *1 receive if switch is on.
*2 m is always treated as "1" regardless of its value.
*3 CS6x only.

Mode 1 : OMNI ON , POLY Mode 2 : OMNI ON ,MONO O : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF,MONO X : No

YAMAHA [Music Synthesizer --- seq. part] Date :13-JUL-1999
Model CS6x/CS6R MIDI Implementation Chart Version : 1.0

Function...	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1 - 16 ×	× ×	Memorised
Mode Default Messages Altered	× × **********	× × ×	
Note Number : True voice	0 - 127 **********	× ×	
Velocity Note ON Note OFF	○ 9nH,v=1-127 × 9nH,v=0	× ×	
After Key's Touch Ch's	○ ○	× ×	
Pitch Bend	○	×	
Control 0-121 Change	○	×	
Prog Change : True #	○ 0 - 127 **********	×	
System Exclusive	○	×	
Common : Song Pos. : Song Sel. : Tune	× × ×	× × ×	
System : Clock Real Time : Commands	○ *2 ○ *2	○ *1 *2 ○ *2	
: All Sound Off Aux : Reset All Cntrls : Local ON/OFF Mes- : All Notes OFF sages: Active Sense : Reset	○ ○ ○ ○ ○ ×	× × × × × ×	
Notes: *1 if MIDI sync is midi *2 if MIDI control in is on			

Mode 1 : OMNI ON , POLY Mode 2 : OMNI ON ,MONO ○ : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF,MONO × : No

CONTROL SYNTHESIZER

CS6x

PARTS LIST

CONTENTS

OVERALL ASSEMBLY 2
PANEL ASSEMBLY 4
WHEEL ASSEMBLY 5
MK ASSEMBLY 6
POWER SUPPLY ASSEMBLY 7
ELECTRICAL PARTS 8

Notes : DESTINATION ABBREVIATIONS

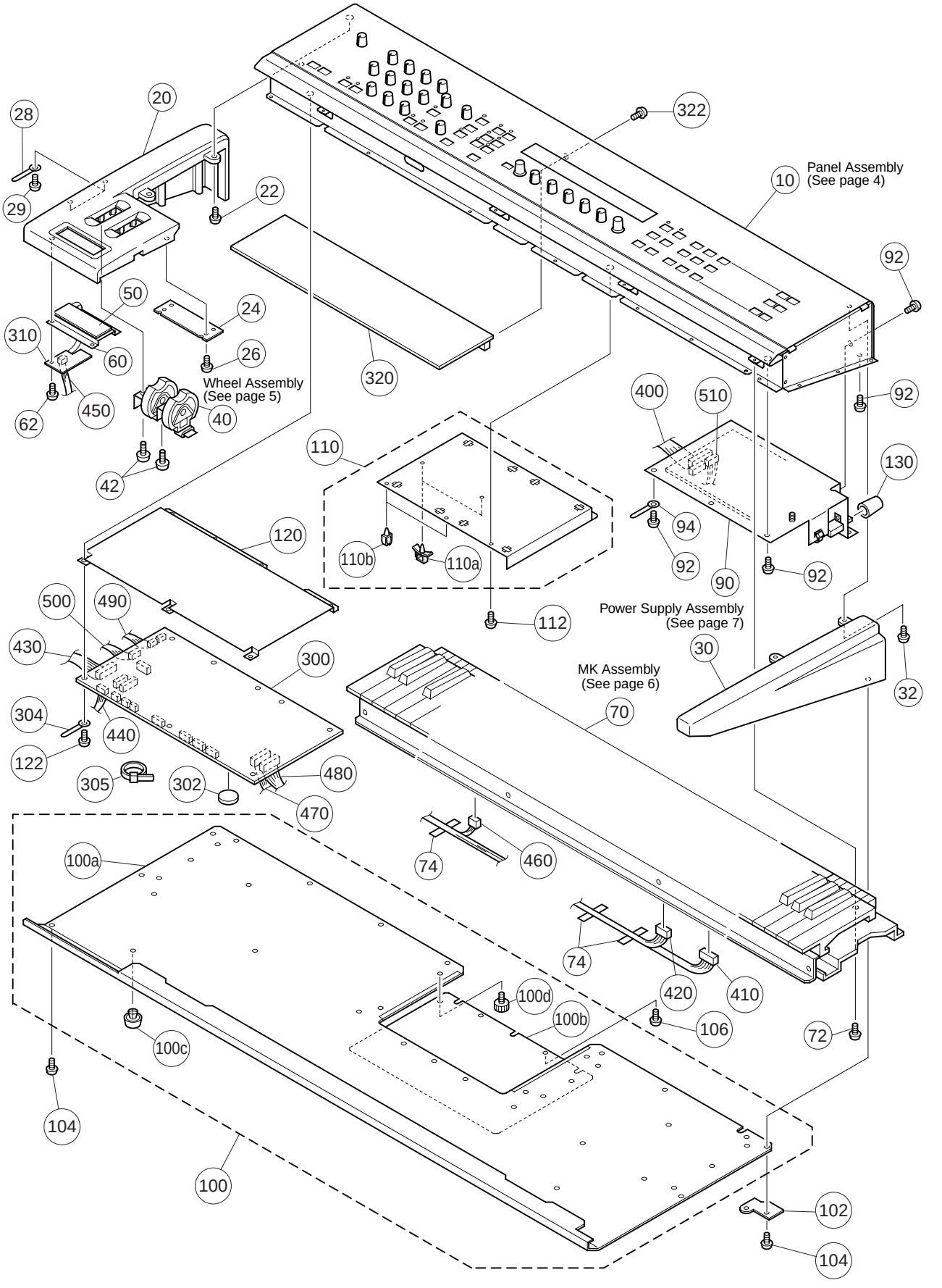
A : Australian model	M : South African model
B : British model	O : Chinese model
C : Canadian model	Q : South-east Asia model
D : German model	T : Taiwan model
E : European model	U : U.S.A. model
F : French model	V : General export model (110V)
H : North European model	W: General export model (220)
I : Indonesian model	N,X : General export model
J : Japanese model	Y : Export model

WARNING

Components having special characteristics are marked ⚠ and must be replaced with parts having specification equal to those originally installed.

- The numbers “QTY” show quantities for each unit.
- The parts with “--” in “PART NO.” are not available as spare parts.
- This mark “ } ” in the REMARKS column means these parts are interchangeable.
- The second letter of the shaded ( ) part number is O, not zero.
- The second letter of the shaded ( ) part number is I, not one.

OVERALL ASSEMBLY



	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
			OVERALL ASSEMBLY			CS6X		
		--	Overall Assembly	J		J (V387080)		
		--	Overall Assembly	U		U (V387090)		
		--	Overall Assembly	E		E,B (V387100)		
	10	--	Panel Assembly			(V387110)		
*	20	V3872400	End Block (L)					
	22	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			2	01
	24	--	End Block Support Plate			(V388590)		
	26	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			4	01
	28	VC380200	Cord Binder	S-15			2	01
	29	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			2	01
*	30	V3872500	End Block (R)					
	32	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			2	01
	40	--	Wheel Assembly			(V387160)		
	42	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			4	01
	50	VU033000	Touch Volume	SMD01 (10KB)		Ribbon		07
	60	--	Ribbon Angle			(V475580)		
	62	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			4	01
	70	--	MK Assembly			(V441400)		
	72	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			4	01
	74	--	Adhesive Tape	12X50m		(2154500)		
	76	CB502030	Cord Binder	S-75B			2	01
	90	--	Power Supply Assembly	J		J,U (V387130)		
	90	--	Power Supply Assembly	E		E,B (V387140)		
	92	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			6	01
	100	--	Bottom Assembly			(V387120)		
*	100a	V3883500	Bottom Cover					
*	100b	V3872200	PLG Cover					
	100c	VC999400	Foot	205Y4179			4	02
*	100d	V4810700	Coin Screw	3.0X6			6	
*	102	V4196900	Corner Plate				2	
	104	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			35	01
*	106	V4810700	Coin Screw	3.0X6			2	
	110	--	PLG Support Brecket			(V474270)		
	110a	VP064300	Cord Holder	LWS-1S			2	03
	110b	VR641100	Cord Holder	UAMS-09-0			2	01
	112	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			5	01
	120	--	DM Shield Plate (L)			(V388400)		
	122	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			7	01
	125	--	DM Shield Plate (U)			(V481130)		
	126	EP600190	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			5	01
	127	VC362700	Ferrite Core	FR25/15/12-1400L				04
	128	CB069250	Cord Holder	BK-1				01
	130	CB825380	Push Button			POWER ON/OFF		03
*	300	V3579100	Circuit Board	DM				
	302	VN103500	Lithium Battery	CR2032				03
	304	CB829850	Cord Binder	S-34Z				03
	305	CB069250	Cord Holder	BK-1			3	01
*	310	V3579700	Circuit Board	RIB				
	312	VC362700	Ferrite Core	FR25/15/12-1400L				04
	314	CB069250	Cord Holder	BK-1				01
*	320	V3579900	Circuit Board	JK				
	322	VQ049800	Bonding Tapping Screw-B	3.0X10 MFZN2BL			9	01
	324	VC362700	Ferrite Core	FR25/15/12-1400L				04
	326	CB069250	Cord Holder	BK-1				01
	400	--	Connector Assembly	11P,5P DM-PS		(V478860)		
	410	--	Connector Assembly	12P 600L DM-KS A		(V381490)		
	420	--	Connector Assembly	13-11P500L DM-KS B		(V381500)		
	430	--	Connector Assembly	15P-450 KRD-KRD		(VK11170)		
	440	--	Connector Assembly	9P-400 KRD-KRD		(VK10990)		
	450	VJ980600	Connector Assembly	4P-400 KRD-KRD				05
	460	--	Connector Assembly	3P 300L DM-KS A		(VS25210)		
*	470	V4788800	Connector Assembly	15PX2PCS PULG-CORE				
	490	--	Connector Assembly	5P-300 KRD-KRD		(VK10560)		
	500	--	Connector Assembly	4P 200L(S) DM-JK		(V417640)		
			ACCESSORIES					
⚠		VT119800	AC Cord	J 7A 125V 3P 2.5M		J		06
⚠		VB927800	AC Cord	CSA		U		08
⚠		VB928000	AC Cord	VDE		E		08

	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
⚠		VP204400	AC Cord	BS 3		B		10
⚠		VQ240200	Adapter, AC Cord	KPR-24		J		06
*		--	CD-ROM	74min. 12cm		(XW444B00)		
*		V5389300	Smart Media					

✻: New Parts

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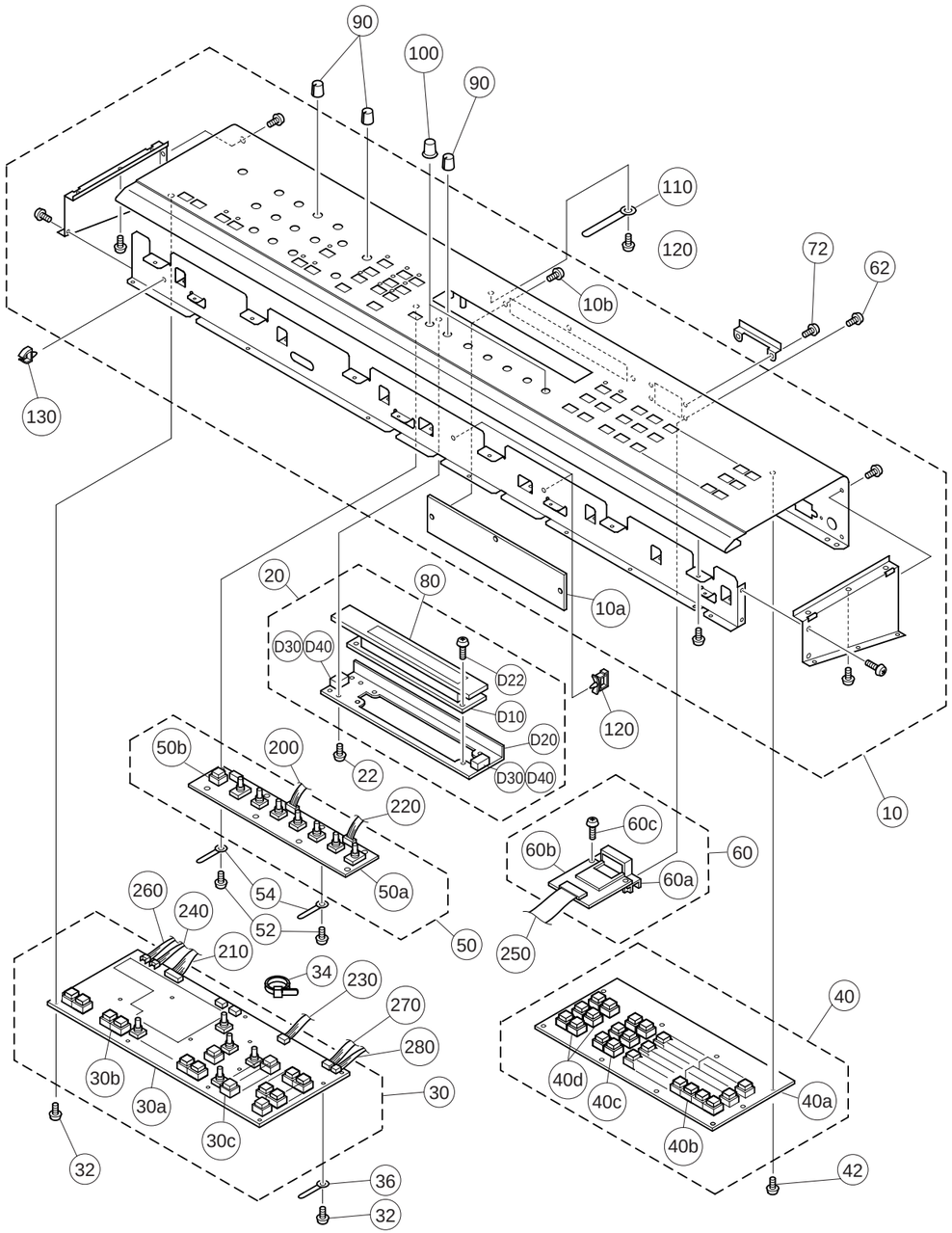
■ PANEL ASSEMBLY



REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		PANEL ASSEMBLY			CS6X		
	--	Panel Assembly			(V387110)		
10	--	Control Panel			(V387190)		
10a	**V3272300**	Cover (S)					08
10b	**VS863000**	Flat Head Screw	3.0X6 MFZN2BL			3	01
20	--	Display Assembly			(V387150)		
22	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			4	01
30	--	Circuit Board Assembly	PNA-SW		(V409790)		
* 30a	**V3579500**	Circuit Board	PNA				
* 30b	**V4162700**	Push Button	M2B		OCTAVE(DOWN,UP),	6	
* 30c	**V4162600**	Push Button	M1B		SCENE(1,2),ARPEGGIO(HOLD, ON/OFF),MODE(VOICE,PER-FORM),(UTILITY,CARD), (EDIT,JOB) PORTAMENTO(ON/OFF), PHASE CLIP(PITCH,REC), SEQ PLAY(TEMPO,PLAY/STOP) MODE(STORE)	6	
32	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			11	01
34	**CB069250**	Cord Holder	BK-1			2	01
36	**CB829850**	Cord Binder	S-34Z				03
40	--	Circuit Board Assembly	PNB-SW		(V409800)		
* 40a	**V3579800**	Circuit Board	PNB				
* 40b	**V3887400**	Push Button	M4B (9-12),(13-16)		(A-D),(E-H),(1-4),(5-8),	6	
* 40c	**V4162700**	Push Button	M2B		(EF BYPASS,MASTER KEY-BOARD),MEMORY(PRE1,PRE2), (INT,EXT),(PLG1,PLG2)	4	
* 40d	**V4162900**	Push Button	M2G		(EXIT,ENTER), (DEC/NO,INC/YES)	2	
42	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			11	01
50	--	Circuit Board Assembly	RV-SW		(V451160)		
* 50a	**V3579600**	Circuir Board	RV				
* 50b	**V4162800**	Push Button	M1G		SHIFT		
52	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			8	01
54	**CB829850**	Cord Binder	S-34Z			2	03
60	--	Smart Media Assembly			(V409770)		
* 60a	**V3882500**	Escutcheon	K-CB				
* 60b	**V3577200**	Circuit Board	SM				
60c	**EP600190**	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			2	01
62	**EP600190**	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			2	01
64	**VP834600**	Adhesive Tape	12X50				02
72	**EP630210**	Bind Head Tapping Screw-S	3.0X6 MFZN2BL			2	01
* 80	**V4742900**	LCD Cover					
* 90	**V4765800**	Knob	K-CB		VOLUME,CUTOFF,RESONANCE, REVERB,CHORUS,ATTACK, DECAY,SUSTAIN,RELEASE, CONTROL,PAN,VEL RATE, PITCH,TEMPO,A,B,C,1,2	20	
* 100	**V3887900**	Knob	ENCODER		PAGE,DATA	2	
110	**CB502030**	Cord Binder	S-75B			2	01
112	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			2	01
120	**VP064300**	Cord Holder	LWS-1S				03
200	--	Connector Assembly	10P-550 KRD-KRD		(VK11400)		
210	--	Connector Assembly	16P-750 KRD-KRD		(VK12060)		
220	--	Connector Assembly	8P-400 KRD-KRD		(VK10980)		
230	**VK111000**	Connector Assembly	7P-450 KRD-KRD				05
240	--	Connector Assembly	4P 100L(S) DM-MVR		(V434190)		
* 250	**V3813800**	FFC Cable Assembly	P=1.0-L-26-430				
260	--	Connector Assembly	5P 300L(S) JK-MVR		(V381550)		
270	--	Connector Assembly	5P-450 KRD-KRD		(VK11090)		
280	--	Connector Assembly	3P-200 KRD-KRD		(VK10230)		
	--	Display Assembly			(V387150)		
* D10	**V4196000**	LCD Assembly					
D20	--	Support Angle	0.8		(V388390)		
D22	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			3	01
D30	--	LCD Spacer			(V419800)	2	
D40	**VP834600**	Adhesive Tape	12X50				02

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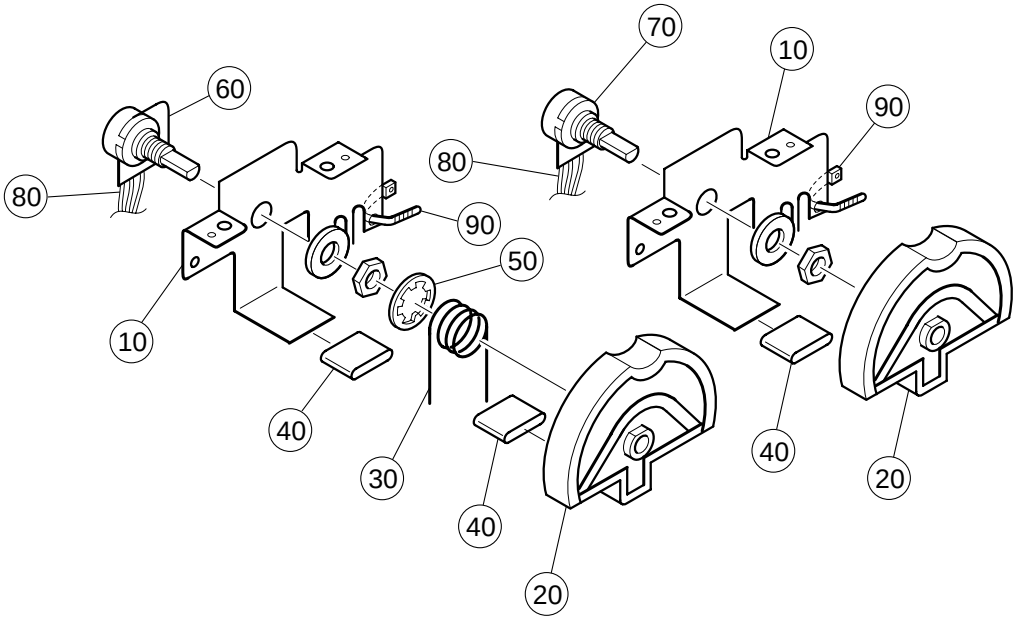
WHEEL ASSEMBLY



REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		WHEEL ASSEMBLY			CS6X		
	--	Wheel Assembly			(V387160)		
10	**VF536800**	Frame				2	02
20	**VQ546400**	Wheel				2	06
* 20	**V4579900**	Wheel			Since 1999,11,01	2	
30	**VC792800**	Spring					01
40	**CB819020**	Wheel Tube				2	04
50	**EW600110**	Stop Ring	12.0				01
60	**VQ764300**	Rotary Variable Resistor	RK1631110T54A 10K		Pitch		03
70	**VN245400**	Rotary Variable Resistor	10.0K K161100S		Modulation		03
80	--	Connector Assembly	5P 100L+X WHEEL		(V381510)		
90	**CB069250**	Cord Holder	BK-1			2	01

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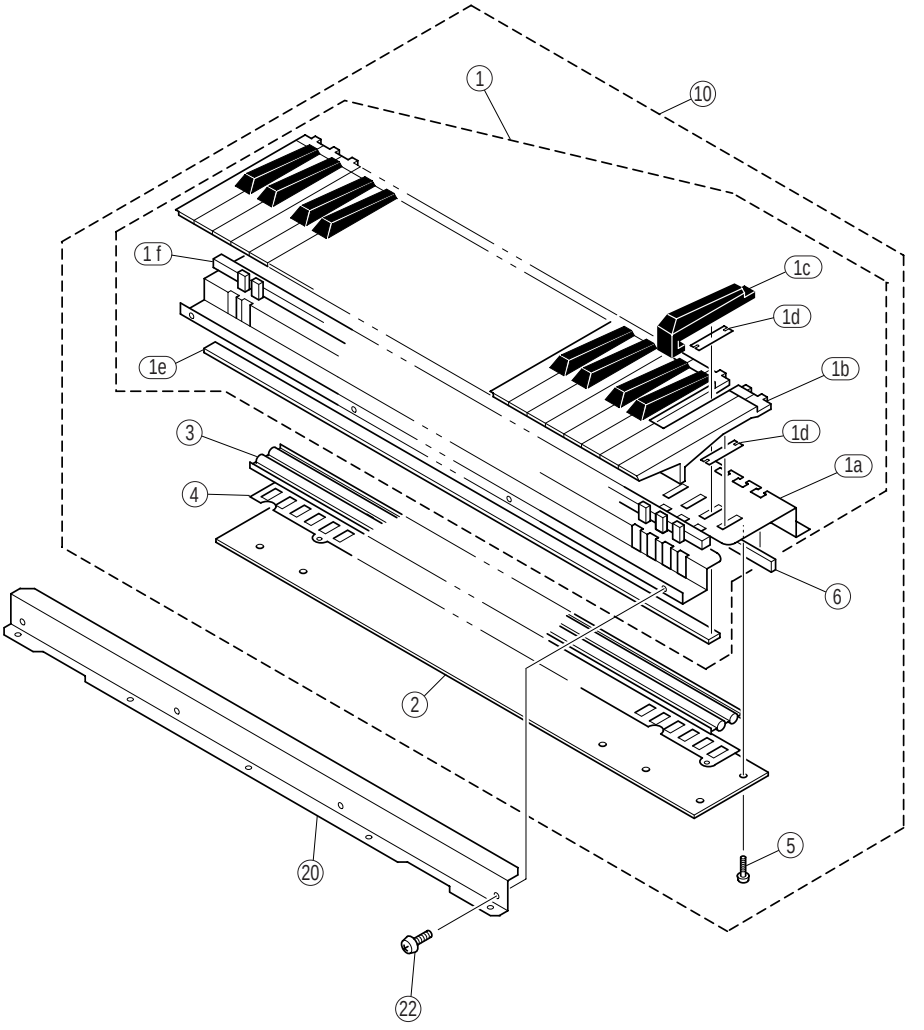
MK ASSEMBLY



REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		MK ASSEMBLY			CS6X		
	--	MK Assembly			(V441400)		
10	**VN399200**	Keyboard Assembly	C61K6				29
20	--	Front Rail			(V410720)		
22	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL			4	01
	VN399200	Keyboard Assembly	C61K6				29
1	**VN405500**	MK Frame Assembly	LC C61				21
1a	--	MK Frame	LC		(VM63000)		
1b	**VL570000**	White Key	C,F			10	03
1b	**VL570100**	White Key	D			5	03
1b	**VL570200**	White Key	B,E			10	03
1b	**VL570300**	White Key	G			5	03
1b	**VL570400**	White Key	A			5	03
1b	**VL570500**	White Key	C'				03
1c	**VL570600**	Black Key	BL			25	03
1d	**VC077600**	Spring				61	01
1e	**VR857100**	Felt	820X6X3.6				03
1f	**VN406100**	PC Sensor	MK-LC61TO-N				10
2	**VI912000**	Circuit Board	LC				14
3	**VF834100**	Rubber Contact	LC				09
4	**VM630100**	Insulation Spacer	LC				06
5	**EP630630**	Bind Head Tapping Screw-S	3.0X10 MFZN2Y			16	01
6	**VC079800**	Stopper	LC				02

✻: New Parts

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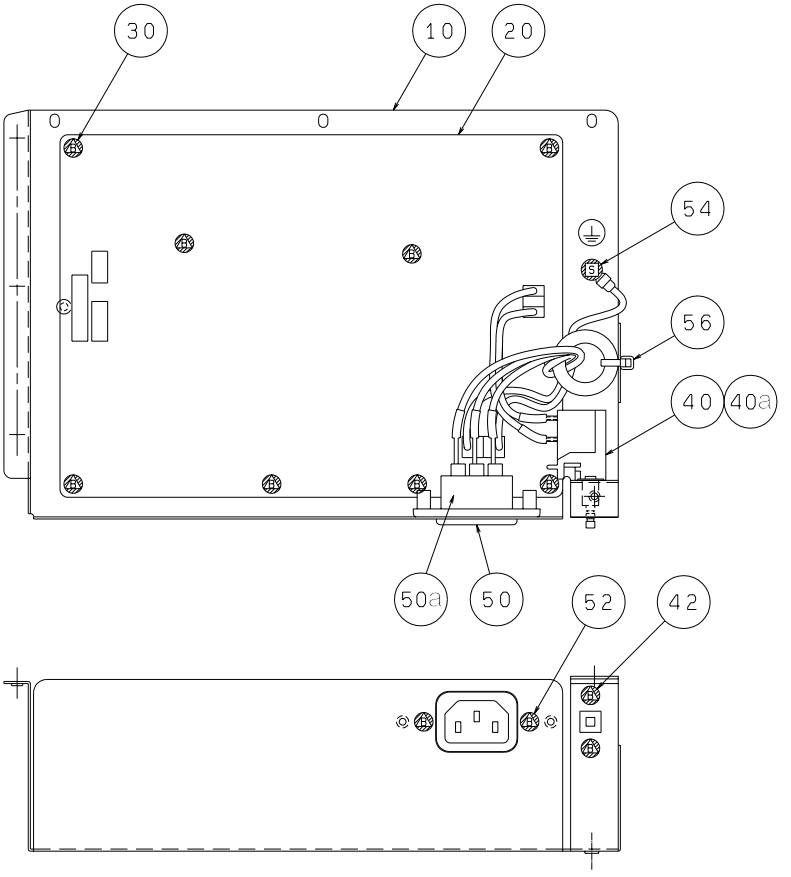
POWER SUPPLY ASSEMBLY



	REF NO.	PART NO.	DESCRIPTION			REMARKS		QTY	RANK
			POWER SUPPLY ASSEMBLY			CS6X			
		--	Power Supply Assembly	J		J,U	(V387130)		
		--	Power Supply Assembly	E		E,B	(V387140)		
	10	--	Shield Plate				(V474280)		
⚠ *	20	**V3484100**	Power Supply Unit	J,U,C		J,U			
⚠ *	20	**V3484200**	Power Supply Unit	E B A		E,B			
	30	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL				8	01
	40	--	Power Switch Assembly	3P 100L		with power SW	(VZ06880)		
⚠	40a	**VP691000**	Push Switch	SDDLB1					03
	42	**EP600230**	Bind Head Tapping Screw-B	3.0X6 MFZN2BL				2	01
	50	--	Connector Assembly	AC-IN3P-2F+1		with AC inlet	(V418560)		
⚠	50a	**VL785200**	AC-IN Connector	AC AC-P01CR02					03
	52	**EP600190**	Bind Head Tapping Screw-B	3.0X8 MFZN2BL				2	01
	54	**03769690**	Bind Head Tapping Screw-S	4.0X8 MFZN2Y					01
	56	**CB069250**	Cord Holder	BK-1					01

*: New Parts

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■ ELECTRICAL PARTS

	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
			ELECTRICAL PARTS			CS6X		
*		**V3579100**	Circuit Board	DM		(XV911B0)		
*		**V3579900**	Circuit Board	JK		(XV914C0)		
		VI912000	Circuit Board	MK		(XH247G0)		14
*		**V3579500**	Circuit Board	PNA		(XV916B0)		
*		**V3579700**	Circuit Board	RIB		(XV916B0)		
*		**V3579600**	Circuit Board	RV		(XV916B0)		
*		**V3579800**	Circuit Board	PNB		(XV917B0)		
*		**V3577200**	Circuit Board	SM		(XV915C0)		
*		**V3579100**	Circuit Board	DM		(XV911B0)		
	BT1	**VN103600**	Battery Holder	CR2032				03
	CN1	**LB918110**	Base Post Connector	XH-11P TE				01
	CN2	**VB390800**	Connector Base Post	PH-12P TE				01
	CN3	**VF283100**	Connector Base Post	PH-13P TE				01
	CN4	**VF283300**	Connector Base Post	PH-15P TE				01
	CN5	**VB390100**	Connector Base Post	PH- 5P TE				01
	CN6	**VB390600**	Connector Base Post	PH-10P TE				01
	CN7	**VF283400**	Connector Base Post	PH-16P TE				01
	CN8	**VB390500**	Connector Base Post	PH-9P TE				03
	CN9	**VB390000**	Connector Base Post	PH-4P TE				01
	CN10	**VB389900**	Connector Base Post	PH-3P TE				01
	CN12	**VK690400**	Header, Flat Cable	HIF3FC 14P TE				02
	CN13	**VB389800**	Connector Base Post	PH-2P TE				01
	CN14	**VB390400**	Connector Base Post	PH-8P TE				01
	CN15	**VE352600**	Connector Base Post	PH-14P TE				01
	CN16	**VF283300**	Connector Base Post	PH-15P TE				01
	CN17	**VB390300**	Connector Base Post	PH-7P TE				01
	CN18	**VM673300**	Header	HIF3FC26PA-2.54DSA				03
	CN19	**VB390000**	Connector Base Post	4P TE				01
	CN20	**VB390100**	Connector Base Post	5P TE				01
	CN21	**VB390400**	Connector Base Post	8P TE				01
	CN22	**--**	Connector	HLW 26P TE		(V353210)		
	D1	**VT332900**	Diode	1SS355 TE-17				01
	-7	**VT332900**	Diode	1SS355 TE-17				01
	D10	**VT332900**	Diode	1SS355 TE-17				01
	-15	**VT332900**	Diode	1SS355 TE-17				01
	D17	**VT332900**	Diode	1SS355 TE-17				01
	-19	**VT332900**	Diode	1SS355 TE-17				01
	D20	**VS201100**	Diode	D1F60				01
	D22	**VT332900**	Diode	1SS355 TE-17				01
	-24	**VT332900**	Diode	1SS355 TE-17				01
	D41	**VT332900**	Diode	1SS355 TE-17				01
	D42	**VT332900**	Diode	1SS355 TE-17				01
	D49	**VV220700**	Diode	RB501V-40				01
	-51	**VV220700**	Diode	RB501V-40				01
	D52	**VS201100**	Diode	D1F60				01
	-55	**VS201100**	Diode	D1F60				01
	D57	**VT332900**	Diode	1SS355 TE-17				01
	-60	**VT332900**	Diode	1SS355 TE-17				01
	D61	**VS201100**	Diode	D1F60				01
	D62	**VS201100**	Diode	D1F60				01
	D65	**VT332900**	Diode	1SS355 TE-17				01
	D66	**VT332900**	Diode	1SS355 TE-17				01
	D68	**VT332900**	Diode	1SS355 TE-17				01
	-71	**VT332900**	Diode	1SS355 TE-17				01
	D73	**VV220700**	Diode	RB501V-40				01
	EM1	**VD542700**	LC Filter	DSS306-93F223Z1				01
	-13	**VD542700**	LC Filter	DSS306-93F223Z1				01
	EM15	**VD542700**	LC Filter	DSS306-93F223Z1				01
	-17	**VD542700**	LC Filter	DSS306-93F223Z1				01
*	IC1	**XW419400**	IC	HD64F7045F24F		CPU		
*	IC2	**XW476300**	IC	28F160S5		FLASH ROM1 16M		
*	IC3	**XW477300**	IC	28F160S5		FLASH ROM2 16M		
	IC4	**XV976A00**	IC	M5M51008CFP-70H		SRAM 1M		07
	IC5	**XV976A00**	IC	M5M51008CFP-70H		SRAM 1M		07
	IC6	**XV077A00**	IC	MSM514260C-60JS		DRAM 4M		07
	IC7	**XI686A00**	IC	M62021FP		SYSTEM RESET		04
	IC8	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
*	IC9	**XV833A00**	IC	MBCG46183-129		GATE ARRAY		

*: New Parts

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	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
	IC10	**XM234A00**	IC	HD63B01Y0RCE0F		CPU		08
	IC11	**XT487A00**	IC	TC74VHC245F		TRANSCEIVER		03
	IC12	**XV103A00**	IC	M5M34051FP		LINE TRANSCEIVER		05
	IC13	**XS790A00**	IC	TC74HC4052AF		MPX		02
	-16	**XS790A00**	IC	TC74HC4052AF		MPX		02
	IC17	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
	IC18	**XP003A00**	IC	TC74HC74AF		D-FF		01
	IC19	**XP003A00**	IC	TC74HC74AF		D-FF		01
	IC20	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
	IC21	**XI348A00**	IC	SC7SU04FEL		INVERTER		01
	IC22	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
	IC23	**XQ138A00**	IC	NJM4556AMT1		OP AMP		03
	IC26	**XS048A00**	IC	HD74LVC139FPEL		DEMULTIPLEXER		03
	IC27	**XH223A00**	IC	SN74HC273NSR		D-FF		01
	IC28	**XH223A00**	IC	SN74HC273NSR		D-FF		01
	IC29	**XN963A00**	IC	TC74VHC32F		OR		01
	IC30	**XR682A00**	IC	TC7S66F		ANALOG SW		01
	IC31	**XD838A00**	IC	SN74HC245NSR		BUFFER		04
	IC32	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
	IC34	**VN686000**	Photo Coupler	PC410T				04
	IC36	**XS725A00**	IC	TC203C760HF-002		SWP30		19
	IC37	**XS516A00**	IC	UPC2933T-E1		REGULATOR +3.3V		03
	IC38	**XV077A00**	IC	MSM514260C-60JS		DRAM 4M		07
	IC42	**XS048A00**	IC	HD74LVC139FPEL		DEMULTIPLEXER		03
*	IC43	**XW333A00**	IC	MX23C6410TC-10		MASK ROM 64M		
*	IC45	**XW334A00**	IC	MX23C6410TC-10		MASK ROM 64M		
	IC47	**XV932A00**	IC	MSM5118160D-60J		DRAM 16M		
	IC48	**XV932A00**	IC	MSM5118160D-60J		DRAM 16M		
	IC50	**XV242A00**	IC	TC74VHCT245AF		BUS TRANSCEIVER		03
	IC51	**XT800A00**	IC	TC74VHC244F		BUS BUFFER		03
	IC52	**XN971A00**	IC	TC74VHC273F		D-FF		03
	IC54	**XM332A00**	IC	TC74VHC04F		INVERTER		01
	IC55	**XN963A00**	IC	TC74VHC32F		OR		01
*	IC56	**XP713A00**	IC	MM1180ZT		REGULATOR +3.3V		
	IC60	**XM326B00**	IC	JG710069		DDE1		04
	IC61	**XM145A00**	IC	UPD63200GS		DAC		07
	IC62	**XF291A00**	IC	UPC4570G2		OP AMP		03
	IC63	**XM326B00**	IC	JG710069		DDE1		04
	IC64	**XM145A00**	IC	UPD63200GS		DAC		07
	IC65	**XF291A00**	IC	UPC4570G2		OP AMP		03
	IC66	**XU770A00**	IC	PCM1800E/2K		A/D CONVERTER		07
	IC68	**XF291A00**	IC	UPC4570G2		OP AMP		03
	IC71	**XJ598A00**	IC	NJM78L05UA		REGULATOR +5V		02
	IC72	**XN086A00**	IC	NJM79L05UA		REGULATOR -5V		02
	IC73	**XT229A00**	IC	TC74VHC00F		NAND		01
	IC74	**XF291A00**	IC	UPC4570G2		OP AMP		03
	IC75	**XQ173A00**	IC	TC7W32FU TE12L		OR		
	IC100	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
	IC101	**XT487A00**	IC	TC74VHC245F		BUFFER		03
*	IC102	**XW357A00**	IC	DS90C402M		LINE RECEIVER		
	IC103	**XN966A00**	IC	TC74VHC157F		MULTIPLEXER		02
	L2	**VL139800**	Coil (Chip Inductor)	BLM31A700SPT				01
	L3	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-20	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L23	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-48	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L52	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-67	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L70	**VQ724900**	Chip Inductance	BK2125HM601-T				01
	L102	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L103	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L106	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-112	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L114	**VR579900**	Chip Inductance	BK2125HS601-T				01
	RA1	**RE044680**	Resistor Array	68X4				01
	-15	**RE044680**	Resistor Array	68X4				01
	RA16	**RE047100**	Resistor Array	10KX4				01
	-27	**RE047100**	Resistor Array	10KX4				01
	RA28	**RE044680**	Resistor Array	68X4				01
	RA29	**RE047100**	Resistor Array	10KX4				01

*: New Parts

RANK: Japan only

REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
RA30	**RE044680**	Resistor Array	68X4				01
RA31	**RE047100**	Resistor Array	10KX4				01
-33	**RE047100**	Resistor Array	10KX4				01
RA34	**RE047150**	Resistor Array	15KX4				01
RA35	**RE047150**	Resistor Array	15KX4				01
RA36	**RE047220**	Resistor Array	22KX4				01
RA37	**RE047220**	Resistor Array	22KX4				01
RA38	**RE047150**	Resistor Array	15KX4				01
RA39	**RE047150**	Resistor Array	15KX4				01
RA40	**RE047220**	Resistor Array	22KX4				01
RA41	**RE047100**	Resistor Array	10KX4				01
RA42	**RE047220**	Resistor Array	22KX4				01
RA43	**RE047220**	Resistor Array	22KX4				01
RA44	**RE047100**	Resistor Array	10KX4				01
-48	**RE047100**	Resistor Array	10KX4				01
RA50	**RE044680**	Resistor Array	68X4				01
RA51	**RE044680**	Resistor Array	68X4				01
RA60	**RE044680**	Resistor Array	68X4				01
-74	**RE044680**	Resistor Array	68X4				01
RA82	**RE047100**	Resistor Array	10KX4				01
RA83	**RE047100**	Resistor Array	10KX4				01
RA85	**RE048100**	Resistor Array	100KX4				01
RA86	**RE048100**	Resistor Array	100KX4				01
TR1	**VD303700**	Transistor	2SC3326 A,B TE85R				01
TR2	**VJ927200**	Transistor	2SA1162 O,Y				01
TR3	**VJ927100**	Transistor	2SC2712 Y				01
TR4	**VJ927200**	Transistor	2SA1162 O,Y				01
TR5	**VJ927100**	Transistor	2SC2712 Y				01
TR6	**VJ927100**	Transistor	2SC2712 Y				01
TR7	**VD303700**	Transistor	2SC3326 A,B TE85R				01
-10	**VD303700**	Transistor	2SC3326 A,B TE85R				01
TR11	**VJ927200**	Transistor	2SA1162 O,Y				01
TR12	**VD303700**	Transistor	2SC3326 A,B TE85R				01
X1	**VV762900**	Quartz Crystal Unit	7M SMD-49				03
X2	**VY681200**	Ceramic Resonator	8M CSTCC8.00MG				01
X3	**VV345500**	Quartz Crystal Unit	DOC-49S5				05
ZD1	**VU171500**	Zener Diode	UDZ 3.6BTE-17 3.6V				01
	UB012390	Monolithic Ceramic Cap.	B 390P 50V K		C:293		01
	UB012470	Monolithic Ceramic Cap.	B 470P 50V K		C:9,289,290		01
	UB012680	Monolithic Ceramic Cap.	B 680P 50V K		C:253,255,260,262,273, 275,279,281		01
	UB013100	Monolithic Ceramic Cap.	B 1000P 50V K		C:115,116,121-129		01
	UB013150	Monolithic Ceramic Cap.	B 1500P 50V K		C:130-137		01
	UB013220	Monolithic Ceramic Cap.	B 2200P 50V K		C:97,99,110		01
	UB013560	Monolithic Ceramic Cap.	B 5600P 50V K		C:252,259,272,278		01
	UB051220	Monolithic Ceramic Cap.	SL 22P 50V J		C:5,6		01
	UB051470	Monolithic Ceramic Cap.	SL 47P 50V J		C:59-73,333		01
	UB051680	Monolithic Ceramic Cap.	SL 68P 50V J		C:256,263,276,282		01
	UB052100	Monolithic Ceramic Cap.	SL 100P 50V J		C:86-93,254,261,274,280, 322,327		01
	UB044100	Monolithic Ceramic Cap.	F 0.01 50V Z		C:7,86-93,98,100,214, 215,338		01
	UB044680	Monolithic Ceramic Cap.	F 0.068 50V Z		C:197,198		01
	UB245100	Monolithic Ceramic Cap.	F 0.1 25V Z		C:1,3,8,10-12,14,15,17, 22,23,25-27,30,31,33-35, 38-40,42,94-96,101-107, 109,111-113,119,120, 138,140,141,143,145, 151-158,160,162, 164-166,170-173,177, 192,193,210-212,217, 218,246,248,266,268, 283,284,288,302,303, 305,310,311,314,315, 317,318,320,321,325, 326,334-337,600-603		01
	VJ927300	Monolithic Ceramic Cap.	1.5 16V F		C:36,37		01
	UF037100	Electrolytic Cap. (chip)	10 16V		C:2,4,13,19,28,45,108, 168,245,251,258, 265,271,277,287,291,312,		01

✻: New Parts

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REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
					316,329-332		
	UF037470	Electrolytic Cap. (chip)	47 16V		C:24,41,44,167,247,249, 250,267,269,270,605		01
	UF038100	Electrolytic Cap. (chip)	100 16V		C:219		01
	UF046470	Electrolytic Cap. (chip)	4.7 25V		C:285,286,323		01
	UF066100	Electrolytic Cap. (chip)	1 50V		C:32		01
	UF066330	Electrolytic Cap. (chip)	3.3 50V		C:29		01
	UF138220	Electrolytic Cap. (chip)	220 16V UUR1C2		C:20,21,47,117,118		01
	UF147470	Electrolytic Cap. (chip)	47 25V UUR1E4		C:308,309,313		01
	UF148220	Electrolytic Cap. (chip)	220 25V UUR1E2		C:307,328		02
*	**UR629220**	Electrolytic Capacitor	2200 10.0V		C:20		
	VP473600	Electrolytic Capacitor	100.00 10.0V		C:139,159,169,175, 194-196,201,604		01
	VP473700	Electrolytic Capacitor	220.00 10.0V		C:142,144,200,202,216		01
	RD153470	Carbon Resistor (chip)	4.7 1/4 J		R:67		01
	RD155470	Carbon Resistor (chip)	470.0 1/4 J		R:231,232		
	RD250000	Carbon Resistor (chip)	0.0 0.0 J		R:66,93,132,141,142,150, 151,215,261,272-277, 290-302,500-503,515, 531,532		01
	RD254100	Carbon Resistor (chip)	10.0 0.1 J		R:121,128		01
	RD254680	Carbon Resistor (chip)	68.0 0.1 J		R:6-8,97,98,143,144, 537-542		01
	RD254820	Carbon Resistor (chip)	82.0 0.1 J		R:83		01
	RD255100	Carbon Resistor (chip)	100.0 0.1 J		R:62,100,101,116,136, 148,230,269-271,298, 506,507,514		01
	RD255120	Carbon Resistor (chip)	120.0 0.1 J		R:258		01
	RD255150	Carbon Resistor (chip)	150.0 0.1 J		R:235		01
	RD255180	Carbon Resistor (chip)	180.0 0.1 J		R:56-61,63-65,96,114,115 117		01
	RD255220	Carbon Resistor (chip)	220.0 0.1 J		R:5,26-29,124		01
	RD255410	Carbon Resistor (chip)	470.0 0.1 J		R:304		
	RD255680	Carbon Resistor (chip)	680.0 0.1 J		R:2,35,259,268		01
	VI192500	Carbon Resistor (chip)	100.0 1/10 D		R:504,505		01
	RD256100	Carbon Resistor (chip)	1.0K 0.1 J		R:18-25,30,31,55,70,73, 76,79,81,82,86,102,103, 123,195,200,205,210, 227,245,255,257,290-293		01
	RD256330	Carbon Resistor (chip)	3.3K 0.1 J		R:4,39,252		01
	RD256470	Carbon Resistor (chip)	4.7K 0.1 J		R:250,251,508,510,512,513 306		01 01
	RD256680	Carbon Resistor (chip)	6.8K 0.1 J		R:196,197,201,202,206, 207,211,212,254		01
	RD257100	Carbon Resistor (chip)	10.0K 0.1 J		R:1,10,11,13,14,32-34,36, 38,42,45-49,53,80, 88-90,99,118-120, 122,129,130,140,145, 152,160,161,164,190, 191,198,199,203,204, 208,209,213,214, 217-219,225,228,234, 237-240,242,246-248, 256,266,294-297,305, 509,511,528-530		01
	RD257220	Carbon Resistor (chip)	22.0K 0.1 J		R:16,17,87		01
	RD257330	Carbon Resistor (chip)	33.0K 0.1 J		R:193,253		01
	RD257470	Carbon Resistor (chip)	47.0K 0.1 J		R:40,41,91,243		01
	RD257680	Carbon Resistor (chip)	68.0K 0.1 J		R:37		01
	RD258100	Carbon Resistor (chip)	100.0K 0.1 J		R:12,50,51,71,72,77,78, 299,233,241,262-264, 303,307		01
	RD258220	Carbon Resistor (chip)	220.0K 0.1 J		R:68,74,236		01
	RD258470	Carbon Resistor (chip)	470.0K 0.1 J		R:94,95,162,163,165		01
	RD258680	Carbon Resistor (chip)	680.0K 0.1 J		R:37		01
	VI197400	Carbon Resistor (chip)	10.0K 1/10 D		R:43,44		01
	VC745200	Metal Oxide Film Resistor	120.0 1W J		R:84		
	VC746300	Metal Oxide Film Resistor	360.0 1W J		R:85		01
*	**V3579900**	Circuit Board	JK		(XV914C0)		

❇: New Parts

RANK: Japan only

REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
20	--	Angle	JKAD		(V388510)		
30	--	Angle	JKBC		(V388520)		
40	VU931500	Holder, Jack					03
50	V2192700	VR Shield					04
60	CB069250	Cord Holder	BK-1				01
C62	VA078900	Jumper Wire	0.55				
CN1	VB390100	Connector Base Post	PH-5P TE				01
CN2	VB390100	Connector Base Post	PH-5P TE				01
CN3	LB918050	Base Post Connector	XH-5P TE				01
CN4	VB390400	Connector Base Post	PH-8P TE				01
CN5	VF283300	Connector Base Post	PH-15P TE				01
CN6	VB390100	Connector Base Post	PH-5P TE				01
CN7	VB390500	Connector Base Post	PH-9P TE				03
D1	VB941200	Diode	1SS133,1SS176				01
-4	VB941200	Diode	1SS133,1SS176				01
EM1	FZ006970	LC Filter	LS MT Y223NB				02
-3	FZ006970	LC Filter	LS MT Y223NB				02
IC1	XQ824A00	IC	NJM4556AD		OP AMP		02
IC2	XC520A00	IC	UPC4570C		OP AMP		01
-4	XC520A00	IC	UPC4570C		OP AMP		01
J	VA078900	Jumper Wire	0.55				
J1	VA078900	Jumper Wire	0.55				
J2	FG644100	Ceramic Capacitor-F	0.01 50V Z				01
-5	FG644100	Ceramic Capacitor-F	0.01 50V Z				01
J7	VA078900	Jumper Wire	0.55				
-11	VA078900	Jumper Wire	0.55				
J12	VI307100	Monolithic Ceramic cap.	0.1 50V Z T=52				01
J13	VI307100	Monolithic Ceramic cap.	0.1 50V Z T=52				01
J16	VI307100	Ceramic Capacitor	0.01 50V Z				01
J19	VA078900	Jumper Wire	0.55				
J20	FG644100	Ceramic Capacitor-F	0.01 50V Z				01
J21	VA078900	Jumper Wire	0.55				
J22	FG644100	Ceramic Capacitor-F	0.01 50V Z				01
J23	VA078900	Jumper Wire	0.55				
JK1	VM576000	Phone Jack	YKB21-5074		PHONES		02
JK2	VB312600	Phone Jack	YKB21-5012		OUTPUT(L/MONO,R)		02
-5	VB312600	Phone Jack	YKB21-5012		INDIVIDUAL OUTPUT(1,2)		02
JK6	V2349300	Phone Jack	HLJ4416 JACK		A/D INPUT(MIC/LINE2)		03
JK7	V2349300	Phone Jack	HLJ4416 JACK		A/D INPUT(LINE1)		03
JK8	VJ144000	DIN Connector	3 DIN YKF51-5041		MIDI(THRU,OUT,IN)		04
JK9	VV269500	DIN Connector	DIN 8P MD-S813		TO HOST		03
JK10	VB312600	Phone Jack	YKB21-5012		FOOT SWITCH		02
JK11	VB312600	Phone Jack	YKB21-5012		SUSTAIN		02
JK12	VM576000	Phone Jack	YKB21-5074		FOOT CONTROLLER		02
JK13	VM576000	Phone Jack	YKB21-5074		FOOT VOLUME		02
JK14	VM552100	Phone Jack	ST HSJ0912-01-01		BREATH		02
L1	VB835000	Coil	FL5R200QNT				01
-22	VB835000	Coil	FL5R200QNT				01
L24	VB835000	Coil	FL5R200QNT				01
-32	VB835000	Coil	FL5R200QNT				01
L33	--	Connector Assembly	JKB=4 5295&5295		(VK26370)		
R84	VA078900	Jumper Wire	0.55				
SW1	VQ665200	Slide Switch	SSSF144-S06N-0		HOST SELECT		03
TR2	IC287820	Transistor	2SC2878 A,B				01
TR4	IC287820	Transistor	2SC2878 A,B				01
-9	IC287820	Transistor	2SC2878 A,B				01
VR1	VK312300	Rotary Variable Resistor	RK09K1110-10KA		GAIN		01
WJ1	--	GND Wire	JK L=80		(V397890)		
	FG612220	Ceramic Capacitor-B	220P 50V K		C:32		01
	FG612470	Ceramic Capacitor-B	470P 50V K		C:13,18,23,28		01
	FG613100	Ceramic Capacitor-B	1000P 50V K		C:3,8,15,20,25,30		01
	FG613150	Ceramic Capacitor-B	1500P 50V K		C:11,16,21,26		01
	FG652100	Ceramic Capacitor-SL	100P 50V J		C:1,2,6,7,12,17,22,27,31, 33,34,46,65		01
	FG644100	Ceramic Capacitor-F	0.01 50V Z		C:5,10,37-45,47-56		01
	UI538100	Electrolytic Cap.	100.00 16.0V		C:4,9		01
	UR837220	Electrolytic Cap.	22.00 16.0V		C:14,19,24,29,36		01
	UR847100	Electrolytic Cap.	10.00 25.0V		C:57		01
	UR848100	Electrolytic Cap.	100.00 25.0V		C:58,59-61		01
	UN837100	Electrolytic Cap.-BP	10.00 16.0V		C:35		01

✻: New Parts

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	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		HF454560	Carbon Resistor	56.0 1/4 J		R:59,60		01
		HF455100	Carbon Resistor	100.0 1/4 J		R:7,16,19,27,35,43,52,80, 83,90,91		01
		HF455220	Carbon Resistor	220.0 1/4 J		R:5,14,69,72		01
		HF455470	Carbon Resistor	470.0 1/4 J		R:75		01
		HF456100	Carbon Resistor	1.0K 1/4 J		R:25,33,41,49,56-58,61, 62,71,74,76		01
		HF456180	Carbon Resistor	1.8K 1/4 J		R:77		01
		HF456270	Carbon Resistor	2.7K 1/4 J		R:20,28,36,44,70,73		01
		HF456470	Carbon Resistor	4.7K 1/4 J		R:63,66,78		01
		HF457100	Carbon Resistor	10.0K 1/4 J		R:1,3,4,9,10,12,13,18,20, 26,29,34,37,42,45,50, 55,81,88,89		01
		HF457120	Carbon Resistor	12.0K 1/4 J		R:23,31,39,47		01
		HF457220	Carbon Resistor	22.0K 1/4 J		R:64,67		01
		HF457470	Carbon Resistor	47.0K 1/4 J		R:6,15,22,24,30,32,38,40, 46,48,53,54,82		01
		HF458100	Carbon Resistor	100.0K 1/4 J		R:65,68		01
		HF458220	Carbon Resistor	220.0K 1/4 J		R:79		01
		HF459100	Carbon Resistor	1.0M 1/4 J		R:51,87		01
		VI912000	Circuit Board	MK		(XH247G0)		14
		VQ359100	Adhesive Tape	24mm 330m				
		VA078900	Jumper Wire	0.55				
	CN1	**VE387000**	Base Post Connector	53014 3P TE				03
	CN2	**VE387800**	Base Post Connector	53014 11P TE				01
	CN3	**VE387900**	Base Post Connector	53014 12P TE				01
	D1	**VB941200**	Diode	1SS133,1SS176				01
	-123	**VB941200**	Diode	1SS133,1SS176				01
	IC1	**IG001390**	IC	RC4558D-V		OP AMP		03
	SC1	**LB016030**	Connector	FFC 3P TE				01
*	VR2	**V4818900**	Trimmer Potentiometer	B 100.0K 3P VZO				02
*	VR1	**V4819100**	Trimmer Potentiometer	B 500.0K 3P VZO				02
		UJ827470	Electrolytic Cap.	47.00 10.0V		C:4		01
		VC694800	Semiconductive Cera. Cap.	0.1 25V Z		C:1-3		01
		HF755150	Carbon Resistor	150.0 1/4 J		R:1,3		01
		HF756100	Carbon Resistor	1.0K 1/4 J		R:4,5,8,10,11		01
		HF756220	Carbon Resistor	2.2K 1/4 J		R:9		01
		HF756680	Carbon Resistor	6.8K 1/4 J		R:2		01
		HF757470	Carbon Resistor	47.0K 1/4 J		R:6,7		01
*		**V3579500**	Circuit Board	PNA		(XV916B0)		
*		**V3579700**	Circuit Board	RIB		(XV916B0)		
*		**V3579600**	Circuit Board	RV		(XV916B0)		
	CN1	**VB858300**	Connector Base Post	PH-4P SE				01
	CN2	**VB858400**	Connector Base Post	PH-5P SE				01
	CN3	**VK015600**	Connector Base Post	PH-16P SE				01
	CN4	**VB858600**	Connector Base Post	PH-7P SE				01
	CN5	**--**	Connector Assembly	8P-500L		(V381570)		01
	CN6	**--**	Connector Assembly	10P-500L		(V381590)		01
	CN7	**VB858400**	Connector Base Post	PH-5P SE				01
	CN8	**VB858200**	Connector Base Post	PH-3P SE				01
	CN9	**VB389900**	Connector Base Post	PH-3P TE				01
	CN10	**VB390600**	Connector Base Post	PH-10P TE				01
	CN11	**VB390400**	Connector Base Post	PH-8P TE				01
	CN14	**VB390000**	Connector Base Post	PH-4P TE				01
	CN15	**VU033600**	FFC Connector	FM-5P SE				01
	CR1	**VE222400**	Ceramic Resonator	8 MHZ EFO-FC8004A4				03
	D1	**VD631600**	Diode	1SS133,176,HSS104				01
	-19	**VD631600**	Diode	1SS133,176,HSS104				01
*	D58	**V4607200**	Shot Key Diode	1FWJ43N				
*	D59	**V4607200**	Shot Key Diode	1FWJ43N				
*	EC1	**V4434100**	Rotary Encoder	REB161(9*5)PVB17.5		PAGE		
*	EC2	**V4434100**	Rotary Encoder	REB161(9*5)PVB17.5		DATA		
	EM1	**VD542700**	LC Filter	DSS306-93F223Z1				01
	IC1	**XS711200**	IC	MN101C027YB		CPU		06
	IC2	**VH885000**	Transistor Array	TD62785P SOURCE				04
	IC3	**VJ041400**	Transistor Array	TD62381P				04
	IC4	**XT744A00**	IC	TC74VHCT245AFT BUF		BUFFER		07
	J	**VA078900**	Jumper Wire	0.55				

*: New Parts

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	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
	J3	**VA078900**	Jumper Wire	0.55				
	J4	**VA078900**	Jumper Wire	0.55				
	J6	**VA078900**	Jumper Wire	0.55				
	-9	**VA078900**	Jumper Wire	0.55				
	LD1	**VS704700**	LED	SEL2210W TP8 RE		SCENE(1,2),PORT ON/OFF,		01
	-13	**VS704700**	LED	SEL2210W TP8 RE		ARP.(HOLD,ON/OFF),		01
						PHASE CLIP,SEQ PLAY,		
						VOICE PERFORM,UTILITY,		
						CARD,EDIT,JOB		
	RA1	**VF771900**	Resistor Array	RGLE8X103J				01
	SW1	**VZ085500**	Tact Switch	SKQNAM004A		OCTAVE(DOWN,UP),		01
	-19	**VZ085500**	Tact Switch	SKQNAM004A		SCENE(1,2), PORT ON/OFF,		01
						ARP(HOLD,ON/OFF),		
						PHASE CLIP,REC,SEQ PLAY,		
						PLAY/STOP,VOICE,PERFORM,		
						UTILITY,CARD,EDIT,JOB,		
						STORE		
*	VR1	**V3625500**	Rotary Variable Resistor	A10.0K RK14K124		VOLUME		
*	VR2	**V4102900**	Rotary Variable Resistor	B 10.0K RK11K114		CUTOFF,RESONANCE,REVERB,		
*	-20	**V4102900**	Rotary Variable Resistor	B 10.0K RK11K114		CHORUS,PORTAMENTO,PITCH,		
						ATTACK,DECAY,SUSTAIN,		
						RELEASE,CONTROL,PAN,		
						VEL RATE,A,B,C,1,.2		
		FG644100	Ceramic Capacitor-F	0.01 50V Z		C:4,8-11		01
*		**VB639900**	Electrolytic Cap.	4.7 50.0V		C:5,6		
*		**V5220100**	Electrolytic Cap-MA	220.0 10.0V		C:1-3,7,12		01
		HF455100	Carbon Resistor	100.0 1/4 J		R:1-5		01
		HF456100	Carbon Resistor	1.0K 1/4 J		R:6,7		01
		HF457100	Carbon Resistor	10.0K 1/4 J		R:8,9		01
*		**V3579800**	Circuit Board	PNB		(XV917B0)		
	D20	**VD631600**	Diode	1SS133,176,HSS104				01
	-55	**VD631600**	Diode	1SS133,176,HSS104				01
	J	**VA078900**	Jumper Wire	0.55				
	J5	**VA078900**	Jumper Wire	0.55				
	LD14	**VS704700**	LED	SEL2210W TP8 RE		EF BYPASS		01
	LD15	**VS704700**	LED	SEL2210W TP8 RE		MASTER KEYBOARD		01
	SW20	**VZ085500**	Tact Switch	SKQNAM004A		EF BYPASS,MASTER KEYBOARD		01
	-55	**VZ085500**	Tact Switch	SKQNAM004A		EXIT,ENTER,DEC/NO,INC/YES		01
						PRE1,PRE2,INT,EXT,PLG1,		
						PLG2,A-H,1-16		
*		**V3577200**	Circuit Board	SM		(XV915C0)		
		VA078900	Jumper Wire	0.55				
	CN1	**--**	Connector, FFC	26P SE		(V457490)		
*	CN2	**V3962800**	Connector	SN015		CARD		
		RD255100	Carbon Resistor (chip)	100.0 0.1 J		R:4-21		01
		RD256100	Carbon Resistor (chip)	1.0K 0.1 J		R:3		01
		RD257100	Carbon Resistor (chip)	10.0K 0.1 J		R:1,2		01
		VT119800	AC Cord	J 7A 125V 3P 2.5M		J		06
		VB927800	AC Cord	CSA		U		08
		VB928000	AC Cord	VDE		E		08
		VP204400	AC Cord	BS 3		B		10
		VU033000	Touch Volume	SMD01 (10KB)		Ribbon		07
		VN103500	Lithium Battery	CR2032				03
		V4196000	LCD Assembly					
		VQ764300	Rotary Variable Resistor	RK1631110T54A 10K		Pitch		03
		VN245400	Rotary Variable Resistor	10.0K K161100S		Modulation		03
		VF834100	Rubber Contact	LC				09
		V3484100	Power Supply Unit	J,U,C		J,U		
		V3484200	Power Supply Unit	E B A		E,B		
		VP691000	Push Switch	SDDLB1				03
		VL785200	AC-IN Connector	AC AC-P01CR02				03

*: New Parts

RANK: Japan only

■CS6X CIRCUIT DIAGRAM 1/4 (DM1/3)

CS6X

to PS-CN3

to JK-CN5

to SV-CN3

to RV-CN5

to WHEEL

to JK-CN7

to RIBBON

to LC KEYBOARD

to RV-CN6

to PN-CN7

to DM3/3 B8

to DM2/3 J5

to DM2/3 J11

to PLUGIN1

to PLUGIN2 -CN1

KEYBOARD CN1,CN3

KEYBOARD CN2,CN4

IC10 HD63B01Y0RCE0F *CPU*

IC1 MASK CPU HD6437045F24F *CPU*

PHOTOCOUPLER

LINE TRANSCEIVER

INVERTER

OP AMP

MPX

D-FF

TRANSCEIVER

DEMULTIDLEXER

ANALOG SW

OR

GATE ARRAY

SYSTEM RESET

BUFFER

FLASH ROM1 16M

FLASH ROM2 16M

SRAM 1M

DRAM 4M

to DM2/3 A5

to DM3/3 B1

to DM2/3 H9
to DM3/3 B3
to DM2/3 H9
to DM3/3 B4

28CC1-8813230 A

CS6X

■CS6X CIRCUIT DIAGRAM 2/4 (DM2/3)

•MM1180ZTT (XP713A00) REGULATOR+3.3V	•NJM78L05UA (XJ598A00) REGULATOR +5V	•PC2933T (XS516A00) REGULATOR +3.3V	•NJM79L05UA (XN086A00) REGULATOR -5V
1: V in 2: GND 3: V out	1: OUTPUT 2: COMMON 3: INPUT	1: V in 2: GND 3: V out	1: GND 2: INPUT 3: OUTPUT

(セ) : Ceramic Capacitor
金被 : Metal Flame Resistor

Note : See parts list for details of circuit board component parts.

DRAM 16M

WROM 64M

DEMULTIPLEXER

MULTIPLEXER

LINE RECEIVER

INVERTER

BUFFER

A/D CONVERTER

OP AMP

REGURATOR +5V

REGURATOR -5V

IC36 Master **SWP30B**

DRAM 4M

to DM1/3 I7 MLAN_CLK_SEL

to DM3/3 J4 to DM1/3 O9

to DM1/3 O9

to DM1/3 I7

to DM3/3 J4,K10

to DM3/3 B2 to DM1/3 G12

to DM1/3 A10

to DM1/3 D6 to DM1/3 B7

to DM1/3 C6

to DM1/3 L8

to DM1/3 N4

to DM1/3 G7

to JK-CN4

to DM3/3 L10

to DM1/3 O8

to DM1/3 N8

to DM3/3 J5

28CC1-8813230-3 ⚠4

28CC1-8813230 ⚠1

■CS6X CIRCUIT DIAGRAM 3/4 (DM3/3, AE88L, AE C, AE88H))

BUS TRANSCEIVER

to DM1/3 G12
to DM2/3 A5

IC50 TC74VHCT245 — MCPUD[0-31]

OR — IC75 TC7W32FU

BUS BUFFER — IC51 TC74VHC244F

to DM1/3 B12 MCPURD
to DM1/3 I9 SMIO_CS
to DM1/3 B12 MCPUWR

IC55 TC74VHC32F

D-FF — IC52 TC74VHC273F

INVERTER — IC54 TC74VHC04

to DM1/3 M10 HD_RES2
to DM1/3 I9 SMCTR_CS

to DM1/3 C6 SMART_VPRT
to DM1/3 D6 SMART_VINS
to DM1/3 D6 SMART_BUSY

CN22 HLW2655-2C7 — to SM-CN1

SM-I/O[1] SM-I/O[2] SM-I/O[3] SM-I/O[4] SM-I/O[5] SM-I/O[6] SM-I/O[7] SM-I/O[8]
SM-CLE SM-ALE SM-RE SM-WE SM-WP SM-CE
SM_INS
SMART_BUSY SMART_VPRT SMART_VINS

REGURATOR +3.3V — IC56 MM1582ZT

LPF / DAC / DDE1 / OP AMP

to DM2/3 P4 MLAN_RESET — IC73 TC74VHC00 NAND

to DM2/3 J6 SWPM_CK256
to DM2/3 J6 SWPM_SYOD
to DM2/3 I12 SWPM_DAC0
to DM1/3 I12 SWPM_MEL00
to DM1/3 M9 HD_RES1

IC51 UPD63000GS — DAC
IC60 JG710069 — DDE1
IC63 JG710069 — DDE1
IC64 UPD63000GS — DAC

IC62 UPC4570G2 — OP AMP
IC65 UPC4570G2 — OP AMP
IC66 UPC4570G2 — OP AMP

LPF — OP AMP — TR7 2SC3326
LPF — OP AMP — TR8 2SC3326
LPF — OP AMP — TR9 2SC3326
LPF — OP AMP — TR10 2SC3326

CN19 PH4P — to PNA-CN1
CN20 PH5P — to JK-CN2

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AE88L

to DM-CN103
to DM-CN102

AE C

to DM-CN103
to DM-CN102

AE88H

PS

※J, U, C

V348410

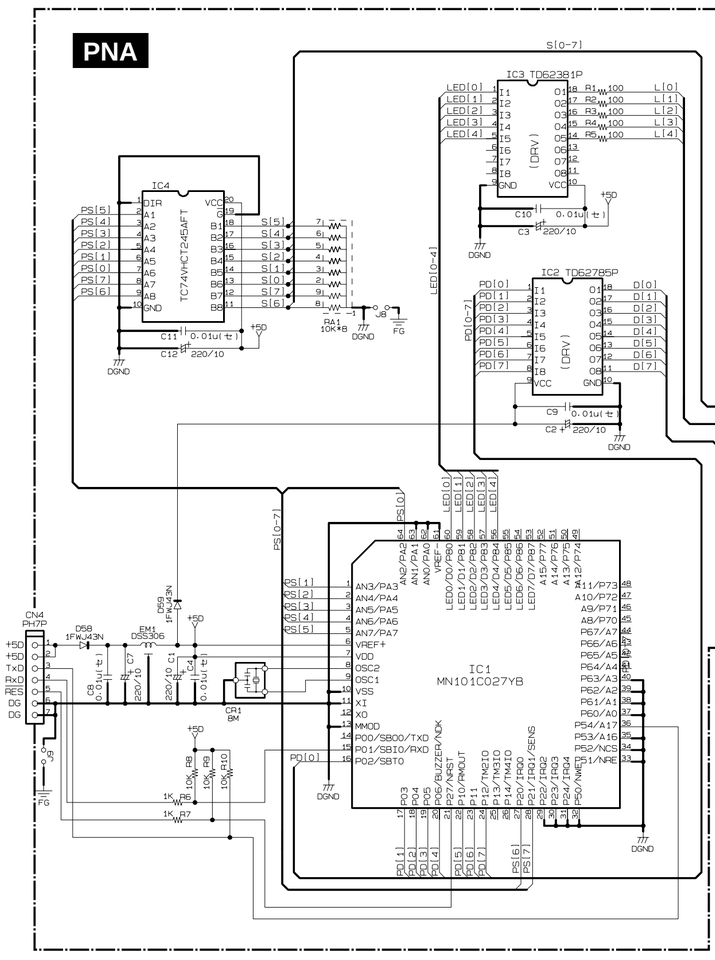
※E, B, A

V348420

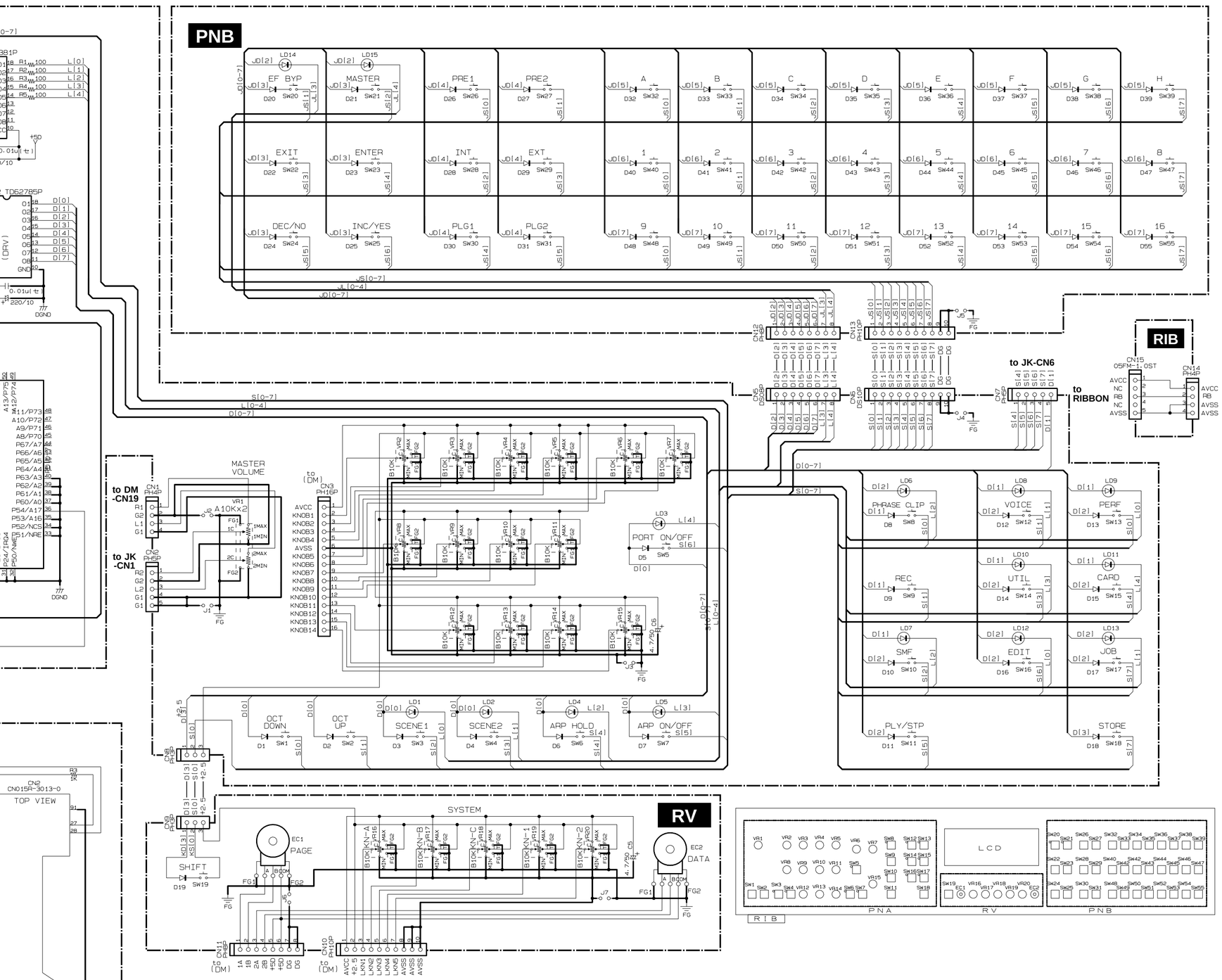
■CS6X CIRCUIT DIAGRAM 4/4 (PNA, PNB, JK, RIB)

CS6X

PNA

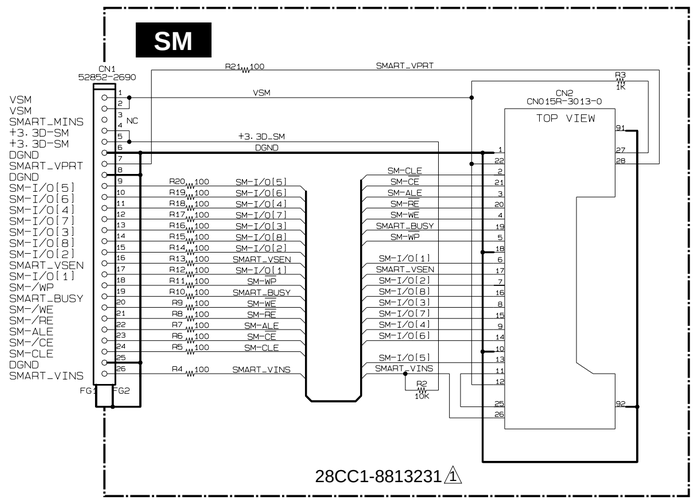


PNB



RIB

SM



JK